The Physiologist

Silas Weir Mitchell

Second President
American Physiological Society

Volume 2
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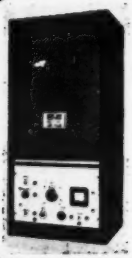
PHYSIOLOGICAL SOCIETY

A TRIO OF TOOLS for Metabolic Measurements

1. SONIC GAS ANALYZER (Kniazuk-Prediger Type)



For measurement of Respiratory Quotient (R.Q.) Basal Metabolic Rate, Oxygen Consumption, CO_2 Content of expired air.

Many other physiological parameters can be measured by the use of special sampling techniques.

The analyzer is sensitive to 80 parts per million of oxygen and to 16 parts per million CO_2 in air.

This apparatus was developed at the Merck Institute for Therapeutic Research for making RQ measurements to a high accuracy and precision.

FEATURES

Convenient Sampling: Continuous or fixed samples can be used.

Simple Operation: No special skill required, the instrument cannot be damaged by normal use.

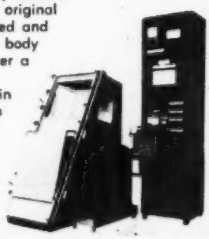
Accurate: Oxygen uptake, ± .008%; R.Q., ± .005%.

WRITE FOR FREE BULLETIN 175

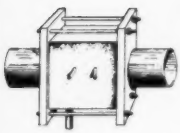
2. BODY VOLUME DETERMINATOR

An improved apparatus for the determination of net body volume by the helium dilution method is now available. Based upon an original design by Dr. William E. Siri the new apparatus has been simplified and improved so that it may be attended by a single operator. The body volume of patients can be determined in less than 20 minutes over a range of 40 to 120 liters to an accuracy of 0.08 liters.

In operation the patient is seated in a sealed 400 liter chamber in which the atmosphere is circulated. A measured volume of helium is then introduced into the chamber and allowed to circulate throughout the system, including the patient's lungs. The atmosphere is then analyzed for helium content. Since an almost negligible amount of helium is absorbed by the patient, the fraction of helium in the atmosphere of the chamber is a direct function of the amount of chamber volume displaced by the patient. **WRITE FOR FREE BULLETIN**



3. Vol-O-Flo RESPIRATORY FLOWMETER



The respiratory Vol-O-Flo develops a differential pressure which is proportional to the rate of air flow. It has been designed to have good linearity. The flow element consists of multiple thin, flat plates between which the respiratory air flows. The differential pressure is then proportional to the volume rate of air flow. The differential pressure output of the respiratory Vol-O-Flo is nominally 1 inch of water and the total pressure drop across the flow element does not exceed 2 inches of water. When used with a suitable differential pressure transducer and recorder, the frequency response is flat to 25 cps. **WRITE FOR FREE BULLETIN 161**

MODELS AVAILABLE

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100 Lpm can measure accurately the normal breathing of a subject, and the **750 Lpm** unit can be used under mbc conditions, extreme exercise conditions, etc.

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"Appropriately . . . the *Handbook* begins with a consideration of the nervous system by which the other portions of the body are coordinated and controlled. . . . In contemporary studies of physiological psychology the gap between brain and mind seems most rapidly to be closing; prominent representation of this field is probably the most novel feature of the table of contents of the present Neurophysiology Section."—*From the Preface, Section on Neurophysiology*

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The Physiologist

A Publication for Physiologists and Physiology
Ray G. Daggs, Editor

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Founded in 1887 for the purpose of promoting the increase of physiological knowledge and its utilization.

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Editors Page

MORE ON SOCIETY ELECTIONS

Following the editorial report on Society Elections which appeared in the February issue a few members sent in comments. Some expressed a desire to retain the present system while a few others suggested a method similar to that used by some other organizations including the American Psychological Association herein outlined in principle.

1. Nominating ballots for elective officers sent to all members.

2. The five for each office receiving the greatest number of nominating votes are selected, placed on a final ballot and sent to all members.

3. A committee of three past presidents act as an auditing committee to verify nominations and votes.

This now makes three possible methods for election of officers -- the present method used by APS; the use of a nominating committee; and the method outlined above. Comments from members are welcome.

APS DUES

Several members have inquired as to how their dues to APS are spent. Of the dues paid, $10.00 is for Society obligations and activities -- the remainder is for a journal subscription. For example, if a regular member pays $18.00 dues, $8.00 is for a subscription to Physiological Reviews; if he pays $30.00 dues, $20.00 is for a subscription to the American Journal of Physiology; etc. A regular member must subscribe to one of the three journals (Physiological Reviews, Journal of Applied Physiology or the American Journal of Physiology). Members receive the journals at a reduced rate.

The Society's obligations include membership in the Federation and in AIBS. Bulk dues are paid to each on the basis of the number of regular members of APS. Associate members of APS are not included.

The $10.00 portion of the regular membership dues is allocated as follows:

$4.00 - Federation. For this the individual regular members of APS receive Federation Proceedings. The Federation supplies the Society with one office room rent free at Federation Headquarters (Beaumont House). The Federation Business Office handles the finan-

ces, bookkeeping and accounting for all APS funds for a fee based on the amount of financial business transacted.

$1.00 - AIBS. For this individual regular members of APS receive the AIBS Bulletin (see article in this issue by W. O. Fenn on the AIBS).

$5.00 - Society activities. Partial support of the Central Office and personnel at Beaumont House, also Council and certain committee activities as well as partial payment of Federation Business Office charge. The remaining support for the Central Office is obtained from grant overhead charges and from the Board of Publication Trustees. The Trustees subsidize THE PHYSIOLOGIST sent to all members free of charge.

The Associate Membership dues are $5.00. Retired and Honorary Members pay no dues.

A yearly resume of the APS general operating fund is given in the May issue of THE PHYSIOLOGIST.

GIFTS

In the May issue an appeal was made for a copy of the history of the APS published in 1938 on the occasion of the fiftieth anniversary. The Society wishes to thank Dr. Esther L. McCandless for sending us a bound copy of the history for the archives.

We are still in need of copies of programs of International Physiological Congresses. The archive files are quite incomplete particularly in relation to the earlier Congresses.

The Central Office is slowly accumulating archival material of historical interest and is in need of some sort of display case for this material at Beaumont House. Gifts and suggestions are always welcome.

THE BIOPHYSICAL SOCIETY

The fourth annual meeting will be held at the Sheraton Hotel in Philadelphia, February 24-26, 1960. Deadline for receipt of abstracts of papers to be presented is December 1, 1959. For further information write to the Chairman of the Program Committee, Dr. O. H. Schmitt, University of Minnesota, or to the Local Chairman, Dr. H. P. Schwan, University of Pennsylvania, Philadelphia 4.

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Use and Care of Animals--A. B. Otis (1961), Chairman; Allan Hemingway (1962), Robert Galambos (1963).
Placement of Senior Physiologists--D. B. Dill (1962), Chairman; W. O. Fenn (1961), W. F. Hamilton (1960), E. M. Landis (1962).
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Historian--John Field II.

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Federation Board--Hallowell Davis (1960), R. F. Pitts (1961), J. H. Comroe, Jr. (1962).
Advisory Committee of Federation--R. F. Pitts (1961).
Federation Secretaries Committee--J. H. Comroe, Jr. (1959), R. G. Daggs (non-voting).
Federation Public Information Committee--Simon Rodbard.
American Association for the Advancement of Science--F. A. Hitchcock (1960), R. G. Daggs.
American Institute of Biological Sciences--W. O. Fenn (1962).
American Documentation Institute--M. O. Lee (1961).
National Research Council--Division of Biology and Agriculture: J. O. Hutchens (1961); Division of Medical Sciences, R. W. Gerard (1961).

Council on Medical Education and Hospitals, A.M.A.--J. S. Gray (1961).
United States National Committee for the International Union of Physiological Sciences--W. O. Fenn (1965), R. W. Gerard (1961), M. B. Visscher (1963), E. M. Landis (alternate).
Council for Coordination of International Congresses--M. B. Visscher.
Council of International Organizations in Medical Sciences--M. B. Visscher.
Joint (with Pharmacology) Symposium Committee on Neuropharmacology--H. E. Himwich (1961), T. C. Ruch (1961).

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American Journal of Physiology and Journal of Applied Physiology--W. D. Armstrong (1960), R. S. Alexander (1961), E. J. Baldes (1962), S. B. Barker (1961), R. W. Berliner (1962), J. R. Brobeck (1962), A. F. Cournand (1962), F. P. Chinard (1962), R. C. de Bodo (1960), Philip Dow (1960), W. S. Fowler (1962), A. S. Gilson, Jr. (1960), H. D. Green (1960), E. G. Gross (1962), A. C. Guyton (1961), H. K. Hartline (1962), A. B. Hastings (1962), H. E. Himwich (1962), Alexander Hollaender (1960), L. B. Jaques (1961), F. H. Johnson (1961), R. E. Johnson (1961), Ancel Keys (1960), W. F. Kolff (1961), Nathan Lifson (1960), W. F. H. M. Mommaerts (1960), G. H. Mudge (1962), E. S. Nasset (1962), H. M. Patt (1960), Hermann Rahn (1960), R. L. Riley (1962), Sidney Roberts (1962), Sid Robinson (1962), Jane Russell (1960), P. F. Salisbury (1961), S. J. Sarnoff (1961), O. H. Schmitt (1960), W. H. Seegers (1962), E. E. Selkurt (1960), H. L. White (1960), E. H. Wood (1960), W. B. Youmans (1960). Consultant Editors--A. Albert (1960), A. C. Burton (1960), J. H. Comroe, Jr. (1961), W. O. Fenn (1962), Alfred Gilman (1962), A. C. Ivy (1960), C. N. H. Long (1960), R. F. Pitts (1960), J. P. Quigley (1960), T. C. Ruch (1961), M. B. Visscher (1962).
Physiological Reviews--H. S. Mayerson (1961), Chairman; C. F. Code (1960), E. M. Landis (1960), V. B. Mountcastle (1960), A. B. Otis (1961), I. H. Page (1960), R. M. Reinecke (1961). Appointee of the Society of General Physiologists--D. R. Griffin (1960). Appointees of the Society of Biological Chemists--J. M. Buchanan (1960), E. L. Smith (1960). European Editorial Committee--G. Kahlson (1960), Chairman; H. Barcroft (1960), E. M. Crook (1960), A. Fessard (1960), E. Lundsgaard (1960).
Annual Review of Physiology--John Field II, (1960), Chairman; J. M. Brookhart (1961), H. W. Davenport (1962), G. K. Moe (1960).
The Physiologist--R. G. Daggs, Editor.

PAST OFFICERS

Presidents--1888 H. P. Bowditch, 1889-90 S. W. Mitchell, 1891-95 H. P. Bowditch, 1896-1904 R. H. Chittenden, 1905-10 W. H. Howell, 1911-13 S. J. Meltzer, 1914-16 W. B. Cannon, 1917-18 F. S. Lee,

1919-20 W. P. Lombard, 1921-22 J. J. R. MacLeod, 1923-25 A. J. Carlson, 1926-29 J. Erlanger, 1930-32 W. J. Meek, 1933-34 A. B. Luckhardt, 1935 C. W. Greene, 1936-37 F. C. Mann, 1938-39 W. E. Garrey, 1938 W. T. Porter Honorary President, 1940-41 A. C. Ivy, 1942-46 P. Bard, 1947 W. O. Fenn, 1948 M. B. Visscher, 1949 C. J. Wiggers, 1950 H. C. Bazett (April to July) D. B. Dill, 1951 R. W. Gerard, 1952 E. M. Landis, 1953 E. F. Adolph, 1954 H. E. Essex, 1955 W. F. Hamilton, 1956 A. C. Burton, 1957 L. N. Katz, 1958 Hallowell Davis.

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Executive Secretary-Treasurer--1948-56 M. O. Lee, 1956 R. G. Daggs.

BYLAWS

(Amended April 1958)

ARTICLE I. Membership

Section 1. The Society shall consist of members, honorary members and associate members.

Section 2. Members. Any person who has conducted and published meritorious original research in physiology and/or biophysics and who is a resident of North America shall be eligible for membership in the Society.

Section 3. Honorary Members. Distinguished scientists of any country who have contributed to the advance of physiology shall be eligible for proposal as honorary members of the Society.

Section 4. Associate Members. Advanced graduate students in physiology at a pre-doctoral level, teachers of physiology, and investigators who have not yet had the opportunity or time to satisfy the requirements for full membership shall be eligible for associate membership in the Society provided they are residents of North America.

ARTICLE II. Officers

Section 1. The management of the Society shall be vested in a Council consisting of the President, the President-Elect, the Past President for the previous year, and four other members. The terms of the four additional Councilors shall be four years each and they

shall not be eligible for immediate reelection except those who have served for two years or less in filling interim vacancies. A person may serve only one term as President, except that if the President-Elect becomes President after September 30 he shall continue as President for the year beginning the next July 1st.

Section 2. Nomination and election of a President-Elect and Councilor(s) shall be by ballot at the Spring meeting of the Society. They shall assume office on July 1 following their election.

Section 3. The President-Elect shall serve as Vice-President and Secretary. Should he have to function as President prematurely, the Council shall select from among its own members a Secretary.

Section 4. The Council shall be empowered to appoint and compensate an Executive Secretary-Treasurer who shall assist it in carrying on the functions of the Society, including the receipt and disbursement of funds under the direction of the Council.

Section 5. The Council may fill any interim vacancies in its membership or vacancies on any Board or Committee of the Society, unless otherwise provided.

ARTICLE III. Dues

Section 1. The annual assessment on members and on associate members shall be determined by the Council and shall be due in advance on July 1.

Section 2. A member whose dues are two years in arrears shall cease to be a member of the Society, unless after payment of his dues in arrears and application to the Council, he shall be reinstated at the next Spring meeting by special vote of the Council. It shall be the duty of the Secretary to notify the delinquent of his right to request reinstatement.

Section 3. A member who has retired from employment because of illness or age may, upon application to the Council, be relieved from the payment of the annual member assessment.

ARTICLE IV. Meetings

Section 1. A meeting of the Society for transacting business, electing officers and members, presenting communications, and related activities, shall be held in the Spring of each year, with other member Societies of the Federation of American Societies for Experimental Biology, except that under exceptional circumstances the Council may cancel such a meeting.

Section 2. A Fall meeting of the Society shall be held at a time and place determined by the Council, for presenting communications and for transacting business except the election of officers.

Section 3. Special meetings of the Society or of the Council may be held at such times and places as the Council may determine.

Section 4. Regional meetings of the Society, for the purpose of presenting scientific communications, may be authorized by the Council.

ARTICLE V. Publications

Section 1. The official organs of the Society shall be the American Journal of Physiology, the Journal of Applied Physiology, Physiological Reviews and such other publications as the Society may own.

Section 2. A Board of Publication Trustees, composed of three members of the Society and appointed by the Council, shall be vested with the full power of the Society to control and manage, both editorially and financially, all of the publications of the Society; to appoint editorial boards; to appoint and compensate a Managing Editor; and to control all publication funds, none of which, however, may be diverted from support of the publications of the Society except by consent of the Council. The term of each member of the Board shall be three years; a member may not serve more than two consecutive terms. The Council shall designate the Chairman of the Board, and shall receive an annual report on the finances, publications and policies. A summary of this report shall be presented to the Society at the Spring meeting.

The Chairman of the Board of Publication Trustees shall be a member ex-officio of the Council but shall have no vote.

ARTICLE VI. Committees and Representatives

The Council may appoint such special and standing committees as it deems necessary or that are voted by the Society.

The Council may name members of the Society as representatives to other organizations whenever it deems such action desirable.

ARTICLE VII. Standing Rules

1. Election to Membership. Two members of the Society must join in proposing a person for membership, in writing and with a statement of his qualifications. The Council may, from the persons so proposed, nominate candidates for election to membership. Nominations shall be presented at Spring and Fall meetings; a two-thirds majority vote of the members present and voting at the next following Fall or Spring meeting shall be necessary for election.

If a Spring or Fall meeting of the Society is not held, the procedures of nomination and/or election of new members may be effected by mail.

The names of the candidates nominated by the Council for membership and statements of their qualifications signed by their proposers

shall be available for inspection by members during the Society meetings at which their election is considered.

2. Election to Honorary Membership. The proposal of an honorary member shall be made by two members of the Society to the Council in writing. The Council may, from the candidates so proposed, make nominations to the Society at a Spring meeting. A two-thirds majority vote of the members present shall be necessary for election.

Honorary members shall have the privilege of attending business sessions of the Society but shall have no vote. They shall pay no membership fees.

3. Election to Associate Membership. Associate members shall be proposed, nominated and elected in the same manner as full members.

Associate members shall have the privilege of attending business sessions of the Society but shall have no vote. Associate members may be nominated for full membership.

4. Presentation of Papers. At a Spring meeting of the Society, held in conjunction with the Federation meetings, a member or honorary member may present orally or by title, be co-author of, or introduce not more than one scientific paper, except upon invitation of the Council. An associate member or a non-member may present orally one scientific paper only if sponsored by a full member of the Society. At a Fall meeting, a member, honorary member, or associate member may present orally not more than one paper, except upon the invitation of the Council.

Upon invitation by the Council, a member may contribute papers to specially designated sessions of the Society without forfeit of his privilege of presenting a regular scientific communication.

5. There shall be a Committee on Membership appointed by and advisory to the Council.

6. There shall be a Program Advisory Committee appointed by the Council.

ARTICLE VIII. General

Section 1. Amendments. These Bylaws, except Article VII, may be amended at any Spring meeting of the Society by a three-fourths majority vote of the members present.

The Standing Rules of Article VII may be amended by a majority vote of the members present at either a Spring or Fall meeting of the Society.

Section 2. Quorum. At all business meetings of the Society fifty members shall constitute a quorum.

Section 3. Parliamentary Authority. The rules contained in Roberts Rules of Order shall govern the conduct of the business meetings of the Society in all cases to which they are applicable and in which they are not inconsistent with the Bylaws or special rules of order of the Society.

INTERNATIONAL ERGONOMICS ASSOCIATION

Announcement has been made of the formation of an International Ergonomics Association, with headquarters in Zurich. ("Ergonomics" is derived from two Greek words and means literally "the customs, habits or laws of work". An international journal, Ergonomics, has been published since 1957.) The association is planning its first meeting in Stockholm in 1961.

The Association is a direct outgrowth of an international seminar on "Fitting the Job to the Worker", held at the Netherlands Institute of Preventive Medicine in Leyden in 1957. The objective of the new Association is to bring together individuals and organizations concerned with development and application of scientific biological knowledge related to optimal utilization of human capacities in work. Involved are the human work scientists in physiology, psychology and anatomy and the users, industrial physicians and engineers as well as organizations representing management and labor. The Association is intended to further two types of communication: between scientific disciplines and between science and industry, both on an international basis.

The organizing committee consists of G.C.E. Burgher (Eindhoven, Holland), Chairman; K.U. Smith (USA), Treasurer; H.S. Belding (USA); G. Lehman (Dortmund, Germany); N.P.V. Lungren (Stockholm, Sweden); B. Metz (Strasbourg, France); and R.G. Stansfield (London, England).

MEMBERSHIP RECORDS

Several times a year the Central Office receives requests from within and outside the Society for factual information about APS members. This search requires considerable time and in many cases the requested information is not available in American Men of Science, The National Register and Who's Who and often if found is out of date, particularly in regard to major current research interests. The Office is called upon to supply names for possible session chairmen at various meetings; those eligible for the Bowditch Lectureship; persons available for committee work both within and outside the Society; persons doing research in a specific area; persons to serve on editorial boards; etc.

It was felt that the best way to obtain the needed information was from the members themselves. It is hoped that you will cooperate by filling out the brief questionnaire that was mailed to all members and return it to the Central Office promptly. Cooperation in matters like this makes your organization more effective and assists materially in advancing the field of physiology and the Society's prestige in it. Please do not forget the questionnaire. The Central Office can do more for you individually and as a Society if personnel records are up to date.

Incomplete data obtained from the National Register indicate the following major areas of research interests of approximately 75% of the APS membership:

Cardiovascular, incl. blood	296
Neurophysiology, incl. psychiatry and special senses	291
Endocrinology	160
Renal, incl. body fluids and electrolytes	100
Environmental	85
Pharmacology, incl. toxicology and anesthesiology	71
Cellular	66
Respiration	62
Muscle	58
Comparative	55
Nutrition and Metabolism	54
Gastrointestinal	52
Radiobiology	51

More complete and accurate data are sorely needed.

APS MEMBERSHIP STATUS

Status as of 1 October, 1959

Regular members	1724
Associate members	59
Retired members	124
Honorary members	16
Total membership	1923

DECEASED MEMBERS

The Society received notices during 1959 of the deaths of the following members. The Society expressed its sorrow and extended sympathy to the families.

E. Braun-Menendez (Hon.) - Buenos Aires, Argentina
Paul O. Chatfield - Asst. Prof. Neurophysiology, Jefferson Medical College
E. F. DuBois (R) - Prof. Emeritus, Cornell
Howard W. Haggard (R) - Tavernier, Florida
K. S. Lashley (R) - Prof. Emeritus, Harvard
L. A. Orbeli (Hon.) - Academy of Sciences, USSR
Fred H. Pratt (R) - Prof. Emeritus, Boston
Ernest Sachs (R) - Prof. Emeritus, Washington University
Harry Spector - Chief, Nutrition Branch, Q.M. Food and Container Inst., Chicago
O. O. Stoland (R) - Prof. Emeritus, Kansas
John B. Watson - Woodbury, Connecticut

NEWLY ELECTED MEMBERS

The following, nominated by the Council, were elected to membership in the American Physiological Society at the Fall meeting, 1959.

FULL MEMBERS

ALMY, Thomas P.: Prof. Med., Cornell Univ. Med. Coll.
BAKER, Saul P.: Asst. Prof. Med., Chicago Med. Sch.
BRICKER, Neal S.: Asst. Prof. Med., Dir. Renal Div., Wash. Univ. Med. Sch.
BRIGGS, F. Norman: Asst. Prof., Tufts Univ. Med. & Dental Sch.
BRODISH, Alvin: Asst. Prof., Yale Univ. Sch. Med.
BRONNER, Felix: Bicknell Res. Assoc. & Dir. Lab. of Min. Met. Hosp. for Spec. Surg., Cornell Med. Ctr.
COOPER, David Y.: Asst. Prof. Surg. Res., Univ. Penna. Med. Ctr.
DANHOF, Ivan E.: Asst. Prof. Physiol., Univ. Texas, SW Med. Sch.
DAVIS, Darrell L.: Asst. Res. Prof., Med. Coll. Ga.
de GROOT, Jack: Asst. Prof., Sr. Res. Fellow PHS, Univ. Calif., S.F.
DESPOPOULOS, Agamemnon: Res. Asst. Prof. Pharmacol., Univ. Louisville Sch. Med.
DOWNER, John L. deC.: Assoc. Physiol., Harvard Med. Sch.
EDEN, Murray: Biophysicist, Natl. Heart Inst.
EYZAGUIRRE, Carlos: Assoc. Prof. Physiol., Univ. Utah Coll. Med.
FEINBERG, Harold : Res. Assoc., Adv. Res. Fellow, Cardiovasc. Dept., Michael Reese Hosp.
FRIEDMAN, Julius J.: Asst. Prof., Physiol. Dept., Indiana Univ. Med. Ctr.
GERST, Elizabeth C.: Instr. Physiol., Columbia Univ. Med. Coll.
GIRLING, Frank: Def. Sc. Serv. Officer, Defence Res. Med. Labs., Ontario.
GLAVIANO, Vincent V.: Asst. Prof. Physiol., Univ. Ill. Coll. Med.
GORDON, Robert S. Jr: Invest., Natl. Heart Inst.

HALE, Henry B.: Assoc. Prof. Physiol., USAF Sch. Aviation Med.
HINSHAW, Lerner B.: Asst. Prof., Univ. Minn.
HYATT, Robert E.: Assoc. Chief Med., Dir. Cardiopul. Lab., Beckley Mem. Hosp., W.Va.
IMUS, Henry A.: Head Dept. Psychol., U.S. Naval Sch. Aviation Med.
JASMIN, Gaetan: Asst. Prof. Exper. Path., Univ. Montreal.
JEFFERSON, Nelson C.: Assoc. Gastroint. Res., Michael Reese Hosp.
JENERICK, Howard P.: Exec. Sec. (Physiol.), Natl. Insts. Health.
JOHN, Erwin R.: Assoc. Prof. Psychol., Univ. Rochester.
JOHNSON, Paul C.: Asst. Prof. Physiol., Indiana Univ. Sch. Med.
KAPLAN, Solomon A.: Assoc. Prof., Dept. Ped., Univ. S. Calif.
KEMP, Cecil R.: Asst. Prof. Physiol., State Univ. Iowa.
KNIGGE, Karl M.: Assoc. Prof. Anatomy, Univ. Cincinnati.
KRAINTZ, Leon: Assoc. Prof. Physiol., Univ. Texas, Dental Br.
KUIDA, Hiroshi: Instr. in Med., Univ. Utah Coll. Med.
LIM, Thomas P.K.: Staff Physiol., Lovelace Fndn.
MACHNE, Xenia: Asst. Prof. Dept Pharmacol., Univ. Ill. Coll. Med.
MacLEAN, Lloyd D.: Asst. Prof. Dept. Surg., Univ. Minn.
MacNICHOL, Edward F., Jr.: Assoc. Prof. Biophysics, Johns Hopkins Univ.
MALVIN, Richard L.: Asst. Prof. Physiol., Univ. Mich.
MANGER, William M.: Instr. Med., Asst. Phys., Columbia Med. Sch. & Presbyterian Hosp.
MARG, Elwin: Assoc. Prof. Physiol. Optics & Optom., Univ. Calif., Berkeley.
MARTIN, Harry B.: Res. Assoc. Dept. Physiol., Harvard Sch. Pub. Health.
McCLINTOCK, Ruth: Asst. Prof. Physiol., Geo. Wash. Univ. Sch. Med.
McILROY, Malcolm B.: Assoc. Prof. Med., Univ. of Calif. Med. Ctr., S.F.
MORGAN, Donald P.: Asst. Prof. Physiol., Northwestern Univ.
MURDAUGH, Herschel V., Jr.: Dir. Renal Sect., Asst. Prof. Med., Univ. Ala.
NEIDLE, Enid A.: Asst. Prof. Physiol. & Biophys., New York Univ. Coll. Dent.
NICHOLS, George, Jr.: Asst. Prof. Med., Harvard Med. Sch.
PATEL, Dali J.: Visit. Scientist, Natl. Heart Inst.
PERRYMAN, James H.: Asst. Prof. Physiol. & Biophys., New York Univ.
PETERS, Joseph J.: Chrmn., Prof. Dept. Biol., Xavier Univ.
PRESTON, James B.: Asst. Prof. Physiol., State Univ. N.Y., Upstate Med. Ctr.
REICHLIN, Seymour: Asst. Prof. Med., Prev. Med. & Psychiat., Wash. Univ. Sch. Med.
RENNIE, Donald W.: Asst. Prof. Physiol., Univ. Buffalo.
ROBILLARD, Eugene: Prof. Physiol., Univ. Montreal.
ROBIN, Eugene D.: Assoc. Prof. Med., Univ. Pittsburgh Med. Sch.
RONDELL, Paul A.: Asst. Prof. Physiol., Univ. Mich.
SAFAR, Peter: Chief Anesth., Baltimore City Hosp., Asst. Prof. Anesth., Johns Hopkins Univ., Cl. Assoc. Prof., Univ. Md.
SALZANO, John V.: Asst. Prof. Physiol., Duke Univ. School Med.
SAYEN, John J.: Phys. Assoc., Prof. Med., Univ. Penna.

SCHNEYER, Charlotte A.: Asst. Prof. Dent., Univ. Ala. Sch. Dent. & Med.
SCHOPP, Robert T.: Asst. Prof. Physiol., Univ. Colo. Med. Sch.
SEARLE, Gordon W.: Assoc. Prof. Physiol., Coll. Med., State Univ. Iowa.
SHERMAN, Jerome K.: Asst. Prof. Anat., Univ. Ark. Med. Sch.
SOKAL, Joseph E.: Chief Cancer Res. Inst., Roswell Park Mem. Inst., Res. Prof. Physiol., Univ. Buffalo.
SOUTH, Frank E.: Asst. Prof. Physiol., Univ. Ill. Coll. Med.
SPYROPOULOS, Constantine S.: Physiol. (Neurol.), Natl. Insts. Health.
STRAUBE, Robert L.: Assoc. Physiol., Argonne Natl. Lab.
STROUD, Robert C.: Superv. Physiol., USN Med. Res. Lab.
TAYLOR, Aubrey B.: Prof. Physiol., Univ. Ill.
ULRICH, Frank: Est. Invest., Am. Heart Assoc. & Instr. Physiol., Yale Med. Sch.
VAUGHAN, David A.: Res. Chem., Arctic Aeromed. Lab., U.S. Air Force.
WELLER, John M.: Assoc. Prof. Int. Med., Univ. Mich. Med. Sch.
WILKS, Syrrel S.: Assoc. Prof. Physiol., USAF Sch. Aviation Med.
WOOD, J. Edwin: Dir. Ga. Heart Assoc., Lab. Cardiovasc. Res., Assoc. Prof. Med., Med. Coll. Ga.

ASSOCIATE MEMBERS

ADAMS, Thomas: Res. Physiol., Arctic Aeromed. Lab., APO Seattle.
BISHOP, Beverly P.: Instr. Physiol., Univ. Buffalo Med. Sch.
BUCHHOLZ, Robert H.: Assoc. Prof. Biol., Monmouth Coll.
CHIASSON, Robert B.: Asst. Prof. Zool., Univ. Ariz.
COHEN, Morton I.: Instr. Physiol., Albert Einstein Coll. Med.
DAWE, Albert R.: Chief Scientist, Chicago Br. Off., Office Naval Res.
ELSNER, Robert W.: Res. Assoc., Univ. Wash.
FARROW, Robert L.: Asst. Prof. Physiol., Sch. Med., Univ. Puerto Rico
FEYERHERM, Harvey A.: Prof. Biol. Sciences, Northern Ill. Univ.
FRANKEL, Harry M.: Physiol. Applied Physiol., Dir. Med. Res. Chem. War. Lab.
GIERE, Frederic A.: Assoc. Prof. Biol., Luther Coll.
GREENE, Leon C.: Sr. Pharmacol./Physiol. Smith Kline & French Labs., Assoc. Physiol., Univ. Penna. Med. Sch.
GUYSELMAN, J. Bruce: Assoc. Prof. Zool., Carleton Coll.
HAUPT, Robert E.: Assoc. Prof. Zool. & Entomol., Iowa State Univ. Sci. & Tech.
HENNACY, Richard A.: Postdoct. Fellow, Cent. Ohio Heart Assoc., Ohio State.
HERTZLER, Emanuel C.: Prof. Biol., Kent State Univ.
HOWELL, Charles D.: Assoc. Prof. Biol., Univ. Redlands.
HUBER, Olive: Prof. Physiol., Hunter Coll.
KADNER, Carl G.: Chrmn. Dept. Biol., Loyola Univ., L.A.
KENNEDY, Thelma T.: Res. Instr. Physiol. & Biophys., Univ. Wash. Med. Sch.
KOCH, Alan R.: Postdoct. Fellow Biophys. Tr. Grant, Univ. Wash.
LARIMER, James L.: Res. Assoc., Duke Univ.
MacHATTIE, Lorne A.: Teach. Fellow Physiol., Univ. Buffalo Sch. Med.

McARTHUR, William H.: Chrmn. Div. Nat. Sc. & Math., Knoxville Coll.
McELROY, William T. Jr.: Res. Assoc., Hahnemann Med. Coll.
McMURRAY, Virginia M.: Instr. Physiol., Univ. Mich.
MENGEBIER, William L.: Head Dept. Biol., Madison Coll.
MILLER, Harvey I.: Grad. Student, Hahnemann Med. Coll.
MURPHY, Sister Mary Kathleen: Instr. Biol., Mary Manse Coll.
O'DELL, Roberta M.: Postdoct. Fellow Zool., Duke Univ.
RANCK, James B. Jr.: Postdoct. Fellow, Univ. Wash.
ROBERTS, Warren W.: Asst. Prof. Psychol., Syracuse Univ.
ROGERS, Thomas E.: Prof. & Chrmn. Biol., Cornell Coll.
SEALANDER, John A. Jr.: Prof. Zool., Univ. Ark.
SEGAL, Earl: Assoc. Prof. Biol., Kans. State Teachers Coll.
STEPHENSON, William K.: Assoc. Prof. Biol., Earlham Coll.
SUDAK, Frederick N.: Asst. Prof., Albert Einstein Coll. Med.
SULLIVAN, Lawrence P.: Instr. Dept. Physiol., Univ. Mich.
SUTER, Sister M. St. Agatha: Biol. Prof. & Dir. Res., Immaculata Coll.
TRECIOKAS, Leo J.: Asst. Prof., Univ. Ill. Med. Coll.
VANDER, Arthur J.: Med. Student, Univ. Mich. Res. Asst. Physiol., Univ. Mich.
WALLER, Hardress J.: Asst. Prof. Physiol., Albert Einstein Coll. Med.
WEISBERG, Howard: Instr. Physiol., Univ. Buffalo Sch. Med.

TRAVEL GRANTS AWARDED BY U.S. NATIONAL COMMITTEE ON IUPS

The following people were awarded travel grants to attend the XXI International Congress of Physiological Sciences at Buenos Aires, Argentina, 9-15 August, 1959.

Abbott, Bernard C.
Adolph, Edward F.
Barlow, George
Battersby, William S.
Beidler, Lloyd M.
Benjamin, Robert M.
Booker, Walter M.
Bonnycastle, Desmond D.
Botts, Jean
Braunwald, Eugene
Brodie, Bernard B.
Chapman, Loring F.
Clark, Robert T.
Clemente, Carmine D.
Cohen, Leonard A.
Congdon, Charles C.
Corner, George W.
Costa, P.J.
Csapo, Arpad
de Groot, Jack
Di Luzio, N.R.
Eisenman, George
Eldred, Earl
Grande, Francisco
Green, Jack Peter
Grisolia, Santiago
Groth, D.P.
Guest, M. Mason
Haddy, Francis J.
Hall, Charles E.
Hamilton, Lyle H.
Hanna, Calvin
Harvey, Rodney B.
Hogben, C. Adrian M.
Hollaender, Alexander
Huang, K.C.
Hughes, John R.
Jardetsky, Oleg
Kao, C.Y.
Karczmar, Alexander G.
Kellogg, Ralph H.
Kennedy, Donald
Kuffler, Stephen W.
Langley, L.L.
LeBlanc, Jacques
Lin, T.M.
Pace, Nello
Parks, Robert E.
Pitts, Grover C.
Pitts, Robert F.
Platner, W.S.
Pradham, S.N.
Preston, James B.
Radford, Edward P., Jr.
Salisbury, Peter F.
Sawyer, Wilbur H.
Scher, Allen M.
Schmidt, Carl F.
Scholander, P.F.
Sherman, Frederick G.
Shideman, Frederick E.
Sjodin, Raymond A.
Skeggs, Leonard T.
Smith, Orville A., Jr.
Sonnenschein, Ralph R.
Spitzer, John J.
Stark, Lawrence
Timiras, Paola S.
Toman, James E.P.

Falk, Gertrude
Featherstone, R.M.
Feller, David A.
Fortier, Claude
Fregly, Melvin J.
Fritz, Irving B.
Gasteiger, Edgar L.
Gerard, Ralph W.
Gerschman, Rebeca
Gertner, Sheldon B.
Gourley, D.R.H.
Lushbaugh, Clarence C.
Magoun, H.W.
Mayerson, H.S.
McCann, S.M.
Meites, Joseph
Meng, H.C.
Miller, James A.
Morales, Manuel
Neptune, Edgar M., Jr.
Opdyke, David F.
Otis, Arthur B.
Tosteson, Daniel C.
Ulrich, Frank
Van Dyke, H.B.
Wagman, Irving H.
Watanabe, Shizuo
Whitehorn, William V.
Wiesel, Torsten
Witt, Peter N.
Wong, H.Y.C.
Wulff, Verner J.
Visscher, Maurice B.

PAST-PRESIDENT'S ADDRESS

Address of Dr. Hallowell Davis, Past-President of the American Physiological Society, before the American Physiological Society Meeting, September 1959, Urbana, Illinois

INTRODUCTORY INTERLUDE

Some years ago at the beginning of his Past-Presidential address, actually the first Past-Presidential address, Wallace Fenn told a story about a cat, a dose of castor oil and nine helpful feline friends. The story has made Wallace not only famous but legendary. I won't repeat it because all members of the American Physiological Society must know it, just as every Proper Bostonian knows "The Midnight Ride of Paul Revere" and every Little Rocker knows the Speech of the Senator from Arkansas. But Wallace's cats have haunted me as I have sat day-dreaming like Bill Hamilton about the Society and its affairs and the Council and its woes, and the cats and the Council and Past-Presidents seem to get all mixed up together. In fact there seems to have been something very prophetic about it.

Cats, cats, cats: Yes, Louis Katz!
And what did Wallace's cats do?
Cats dug holes. Cat digs holes. Katz Daggs holes.
Katz Daggs Pitts!

In this sort of a name game there are no holds barred, but it is confusing because the Katz might either fill up holes or Philip Bard. And if the Pitts were big enough and empty enough they might be Hallowells. (This kind of thing Ruchins some people's digestion, so if anyone feels a little ill he or she may slip outside and lie down on the Davenport; but those who are Hardy will sit right here and take it.)

Well, when the hollow wells or Pitts were duly refilled our hero cat Steggerda around a bit and started back. Ah Visscher could have been there to see him Come rolling home.

(Chorus of Wailing Women, -- off stage)

Olee, Olay - Oh Milton O. Lee. Oh me, oh my, Hy Mayerson!

Wallace, you started all this with your cats; but it's obvious I don't do so well when I try to be Fenny.

That's all. I'm not going through the entire list of Past-Presidents and officers.

ADDRESS

This address of the Past-President at the Fall Meeting has now become an established tradition of the American Physiological Society.

After it the speaker becomes officially an "elder statesman". In my mind's eye I see the event as a dusting off of the place on the shelf where that statesman will thenceforth sit as an historic exhibit in the company of other ancient worthies. I shall dust vigorously, however, even at the risk of making a few of you sneeze.

Let me explain that term "elder statesman", and give you the rule for recognizing one in a business meeting. You certainly know the three other classes of members: the newly elected or "Neophytes", the solid citizens or "Indians", the "men who run things" or "Chiefs".

The newly elected member of two or three years' standing, if he speaks at all in a meeting, usually begins: "But we always do it this way". Traditions develop fast for the freshman, are ivy-clad for the sophomore, and are iron-bound for the junior.

The solid citizen begins: "I pay my dues every year and what do I get for it?" What he means, of course, is "We (meaning himself and the group of his contemporaries who listen to one another's papers) are a progressive group and ought to have better representation in the affairs of the Society and on the program."

The chief, if he is worthy of the name, begins: "We've got a problem. I think it would be a good idea if ...".

And the elder statesman begins, "Now, I remember when...", and then recounts, as a guide for the present and future, an anecdote illustrating the traditions of his freshman and sophomore years.

Thus the circle is closed between the neophyte and the out-of-fight. There is a stabilizing force of tradition at the two ends and a neutralizing of opposing views and desires in the middle and a continual handing along of responsibility from one chief to the next. All of this makes societies such as ours and the Federation rather conservative in their ways.

Now conservatism is a fine thing. If you have found a good way of doing the job, stick to the formula. Don't change your ways on the spur of the moment without anyone's really thinking through the consequences. But, on the other hand, change is sometimes essential if we are to continue to do the job under new conditions, and from time to time even the job itself needs to be re-defined.

This year we celebrate the centenary of the publication of Darwin's "The Origin of the Species". I might have talked about the impact of the theory of evolution on Physiology. Instead, however, I shall consider the impact of Darwin's biological forces on physiologists themselves as members of the human race.

In 1923 I had the privilege of being entertained by Sir William Bayliss at his home. Many of you certainly remember Sir William's book "Principles of General Physiology". This book reflects its author's interest in what we now call biophysics. Sir William cer-

tainly felt a kinship to physicists, and I recall the following story he told after dinner.

"There was a good physicist and there was a bad physicist. The good physicist kept a full record in ink of every experiment. He gave full details of apparatus and experimental procedure in his papers, and he used only a properly designed high-impedance meter to test the state of his storage batteries - or accumulators, as of course Sir William called them. The bad physicist kept his laboratory records in pencil on loose pieces of paper and published only program abstracts in his society's proceedings without following them up with a proper paper. When he tested his accumulators he simply short-circuited them with a screwdriver and not only that but he borrowed the good physicist's screwdriver to do it. Even so they remained friends.

"Finally they both died, and of course the good physicist went to Heaven and the bad physicist went elsewhere. But both were ingenious fellows and they finally developed a communication system from Heaven to elsewhere and vice versa. When they got through to one another the bad physicist asked the good physicist how things were up there and what kind of equipment he had and what he had to do. The good physicist said the equipment was marvelous and you didn't need either a voltmeter or a screwdriver to test your accumulators because they never ran down; and that he was busy eight hours a day on a project to keep all the harps in Heaven in tune automatically. And how was it elsewhere? The bad physicist admitted that it was plenty hot and his tools were old and never in a place where he could find them, but that his work, keeping the infernal heating system in repair, wasn't much of a chore and required only two hours a day. 'Only two hours a day', said the good physicist, 'Why I work eight! How's that?'

"'Well', said the bad physicist, 'it's because there are so darn many of us'."

And that, my friends, is the text for my more serious thoughts for tonight. "There are so darn many of us".

My thesis is that change, continual change, is taking place in our Society and throughout the world, and that, whether we like it or not, the American Physiological Society and every other human organization must change with it. Not only are the changes of which I speak both great and inevitable: they also are rapid, particularly on the time scale of the evolution of human society. I do not have in mind the possible, the all-too-possible, cataclysmic changes that would follow a nuclear war or even a Third World War fought with conventional weapons. I do, however, include the cold war. In fact, I regard the cold war as a semi-permanent institution, much more stable than most national governments. And one big reason why we are caught up in the midst of rapid and inevitable change, both at home and abroad, and are threatened with the real possibility of total or sub-total destruction, is basically very simple. As the bad physicist said to the good physicist, "There are so darn many of us".

I will elaborate a little some of my reasons for believing that the increase of world population is the most important single factor in human affairs today. Medical science, of which we as physiologists are a part, laid a time-bomb by upsetting the long-established balance between birth rate and death rate. The physicists have developed atomic warfare and the H-bomb. The chemists have developed chemical warfare, and some of us as biologists have had a part, directly or indirectly, in developing the unmentionable weapons and countermeasures of biological warfare. But these weapons may never be used. That is our great hope: that they will never be used. But the population bomb is already exploding, in North America, in South America, in Russia, in China, in India, and in fact in almost every country of the world.

We are all biologists, and I think that no biologist can deny the seriousness of the present situation. We all know, of course, that more food can be produced on the surface of the earth than is being produced today. Irrigation, genetics, biochemistry, hydroponics and many scientific discoveries yet to be made will allow the increase of population to continue at its present rate for another generation or two. But just because discovery, ingenuity and industry have kept even so far with the demands of more and more people for more and more food and clothing and shelter, we cannot expect productivity to continue to increase without limit - which, of course, is exactly what population does tend to do.

We have witnessed one scientific miracle in the last twenty years: the control and productive use of atomic energy. This has, in principle at least, broken the energy bottleneck that we will face when our supply of fossil fuels (coal, oil and natural gas) is exhausted. With energy enough available we can, in principle at least, dig deeper mines, concentrate leaner ores, and even recover from the ocean and separate the raw chemical elements that we need. With energy enough we might even obtain from the ocean enough fresh water to grow the food and fiber needed to sustain a much larger population than that of the world today.

But let's not count on too many miracles. This is substantially what the more optimistic prophets of the future tend to do when they conclude, apparently, that the Malthusian equation will be balanced by a geometrical increase in the production of food, clothing and shelter to match the continuing increase of population. The transmuting of matter to energy and one chemical element to another is enough of a miracle to expect from physics. Don't count on a repeal of the law of gravity or even of the second law of thermodynamics. And don't count on finding a way to keep people alive without food! It will be enough to teach people to live on the restricted, semi-synthetic diets of the future and like it.

I prefer to base my hopes on a biological and social miracle: the miracle of population control. We medical scientists started the fire, so to speak, by developing the knowledge and the techniques that have reduced death rates throughout the world. It is now up to us to de-

velop techniques to reduce the birth rate. We may not be too far behind. Chemical and mechanical techniques have proved to be fairly effective in some cultures and economic circumstances, as shown by the stable or near-stable population figures for some European countries where both death rates and birth rates are low. This is obviously a situation that the world might achieve. It must achieve it, or else revert to nature's way of a high death rate to balance the high birth rate. The latter alternative would almost certainly be rather messy, particularly in an initial phase of widespread warfare and the destruction of most of our civilization.

We can look with real pride on the work of some members of our own society, Gregory Pincus, Hudson Hoagland and their many colleagues, who have improved a biological technique of birth control to the point of producing an effective "pill". The pill, taken by mouth, prevents ovulation effectively, temporarily and, apparently so far, without undesirable side effects. It has been through the stage of successful field trials in Puerto Rico. It may not be the last word, but I regard it as a break-through, comparable at least to the electric motor and perhaps even to atomic fission. Here may be a practical way of giving people an effective method of birth control with a chance of making them like it!

If this is true, we don't need another physical, chemical or biological miracle; but we do still need a social and political miracle. The miracle will be to get enough important classes of people in enough important nations to practice population control (by whatever method is acceptable to them, even if it be an increased death rate) and to enforce it on those who will not cooperate voluntarily. Yes, this will be a miracle. The temptation to gain world control by deliberately outbreeding and gradually engulfing competitors through cold if not by hot war will be strong indeed. Armament control will be hard enough to achieve, but perhaps it will come through the obvious threat of the alternative of mutual extermination. Population control may come only when enough people recognize that the alternative is the starvation of billions of humans throughout the world. Such starvation will occur if there should be a breakdown of the very elaborate economic system and technical procedures that will soon be needed to provide the atomic energy to purify and distribute water, to grow or manufacture and to distribute the necessary food and fiber and to dig deep mines and to concentrate poor ores -- as we must do in another generation or two. Even as it is, another major depression of the economy of the United States would be a global calamity. It would be the indirect cause of starvation, disease and destruction in many countries other than our own.

Even if all governments agreed this year on the principle of population control there would be enough inertia, if not active resistance from large and important groups within many countries, to delay considerably the attainment of a balance of births against deaths. The balance, if and when it is achieved by reduction of the birth rate, will be at a considerably higher level, probably at least double or treble the present world population. As I see it, we are faced with the ab-

solute certainty of an increasing population for a generation or two (barring always a large-scale nuclear war). This population will be increasingly dependent on complex technical tools and methods for its agriculture, for its manufacture, for its transportation and for its communication. Scientists of all sorts, and that includes us physiologists, will be essential in the struggle against the rising tide of population, - both to do the necessary immediate things and to invent better ways of doing them and to discover new principles on which to base new inventions. A continuing and accelerated technical advance is assumed as axiomatic and a self-evident necessity by every prophet, whether his forecast be bright or gloomy.

In other words, not only will there be more of us people just as people but there will be relatively more of us scientists. There will be more good physicists and physiologists and there will be more bad physicists and physiologists, and even the bad ones will have to work more than two hours a day. They will have more to do than to keep the infernal heating system in order.

Two approximate calculations that I have read in what I consider reputable books or magazines, although I cannot cite the exact source of either, are probably nearly enough correct, if we define our terms properly, to illustrate dramatically the recent rapid increase of world population as a whole and of scientists as a group.

The first statement is that of all the members of the human race who have ever lived beyond childhood, since the dawn of pre-history, twenty per cent are alive today. I have not checked the calculation in any detail but I think it is approximately correct. I have myself introduced the qualification "beyond childhood" to avoid counting the infants and children who died by the tens of millions during the long era of high infant mortality.

The second statement is that at least ninety per cent of all scientists who have ever lived are now alive. By "scientists" I mean a professional specialist in research or in an applied technical specialty such as medicine or engineering. I do not include the skilled craftsmen who learned a trade by apprenticeship. I do include physiologists. Again, I have not undertaken to verify the calculation, but the corresponding percentage of living members for the American Physiological Society was 85 per cent before this afternoon's elections. Why, I myself remember when -- No, darn it! I'm not going to start being an elder statesman until I finish this speech!

During the last two years I have spoken and written more than once on some of the specific problems of both the APS and the Federation that grow directly from their increasing size: the curse of bigness. Housing and physical facilities are barely adequate, our programs are overloaded, we have to maintain a professional secretariat and we have to pay larger dues to support the increasing activities of the Society.

I will not repeat tonight either my analysis of some of these problems or my recommendations for dealing with them. They are on the

record. My point is simply that inevitably, for better or worse, there are going to be more and more of us scientists, good and bad. New specialties, such as scientific administrator and scientific communicator, will be needed in addition to investigator, teacher and applied scientist, and they must find their places in the scheme of things. Old ways of doing things and even some of our basic assumptions may no longer be effective or valid. The place of scientists in society at large and also the best form of organization for scientists will continue to change. We old folks may think fondly of the good old days, but our thoughts won't help you young fellows a bit.

Boys and girls, you've got a problem, and it won't go away: the problem of growth. It's real and it's yours.

Now, as I take that last step up onto the dusty shelf, and while I still have you as a captive audience, I would like to read you about six hundred words that I put together a few years ago for Edward R. Murrow's radio program "This I Believe". I have added only a few words to the original version. It is my credo.

I speak as a scientist.

I believe in Man. I believe in Man as a part of Nature. Nature includes the physical universe, the life of plants and animals and man, and also the mind and thoughts of man. I believe in Nature's laws; impersonal and merciless, but reliable. I believe that man can learn enough of Nature's laws to shape his destiny, but nevertheless his destiny must remain within the bounds of Nature's laws. It is man's fate to struggle for existence with other living things and with himself. It is man's privilege to rule this planet for many million years if he is able. The survival of mankind is the yardstick by which I measure good and bad.

The struggle for existence is not easy nor can I be sure we will succeed. I believe that man is on his own. He can learn to control and use some of Nature's forces and perhaps even to control himself. But I also believe that man may fail, and may destroy civilization and possibly even life itself by his own acts. So I believe it is the duty as well as the privilege of each of us to learn what more he can about the ways of Nature and of man. Also it is not enough only to learn. New knowledge must be shared if it is to help mankind. Here I believe is our immortality: what we teach to those who follow us.

There are also ways of life that I believe are good. They are not taught by word of mouth alone but also by example. Everyone has his list, I am sure, but here is mine.

I believe in the integrity of speech. As Jesus said, "Let thy yea be yea and thy nay be nay."

I believe in tolerance, in freedom of thought and speech, and in

the Golden Rule. These rules begin at home but should also extend to national laws and policies.

I believe in respect for law. But this assumes, of course, that man-made laws must contain within themselves the rules for lawful change. Readiness for change is fully as important as respect for law and tradition. Conditions change. Evolution is part of Nature's law.

I believe in patience. Evolution is slow. Individuals change only a little. Young liberals become moderate conservatives. Extremists do not change, but fortunately they fade away.

I believe deeply in the Brotherhood of Man, of all mankind. I do not like the alternative theory of a Master Race, or Master Class. When I speak of the survival of the human race, I mean the entire human race, not only the yellow, the brown, the black or the white. But I also believe that the human race cannot continue to increase and multiply indefinitely and I see great danger that the struggle for subsistence will set race against race and nation against nation in a series of wars to the death. Here I believe lies the greatest challenge of the future. Can mankind realize the ideals of tolerance and co-operation at the racial and national level and can control of the world's population be achieved without recurring war, pestilence and famine? Frankly I believe the chances are poor in our era. It may happen after the next Great Glacier has come and gone or it may never happen, but this I believe and believe with all my heart: it is possible that it can happen and that our own efforts and the examples of our lives can help it happen. On this possibility I stake my faith. I still believe in man.

THE AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES

WALLACE O. FENN

It is gratifying to learn that the Council of the American Physiological Society has voted to retain full membership for our Society in the American Institute of Biological Sciences. This vote was taken in spite of the new AIBS dues requirement of $1.00 per member per year. Previously the limit was $1000 per society, so that the cost per member was only about 59 cents for our Society with its 1700 plus members. Nevertheless AIBS had to supply the Bulletin to every member, at a cost of more than $1.00. It did not seem fair to make the smaller societies help to pay for the Bulletin sent to members of the larger societies. The Governing Board of AIBS regretfully voted to eliminate this inequity by requiring $1.00 for every member regardless of the size of the society. Even this, by strict accounting, does not half pay for services rendered.

Members of the American Physiological Society may fairly ask why we should join AIBS when we are already in the Federation. As a Past-President of both the American Physiological Society and the American Institute of Biological Sciences, I have given much thought to this question. I have been asked by the Council to present the argument as I see it.

In the first place full membership in AIBS affirms our belief that physiology as a science must include all of biology and not merely the applications to medicine. This is particularly important because many of our members come to us from departments of biology.

Secondly, as a full member, the American Physiological Society has a voice and a vote in the activities of AIBS. This is of real importance since, except for the American Society of Parasitology, ours is the only full member society with strong affiliations with medicine. In activities concerned with the defense of medical research and the use of experimental animals, this has already proved to be of critical importance. The medical scientists need the support of the biologists and we can suffer serious consequences if this support is lost.

It should also be stated that the biologists lose a lot if the physiologists hold themselves too much aloof. A study of the program of papers presented at an AIBS annual meeting demonstrates clearly that even when the Society of General Physiologists puts on a program most physiologists prefer to present their papers before the larger APS meetings. By meeting always by ourselves or with the Federation we have largely eliminated this great opportunity for contacts with the biologists of the country. This is a great loss on both sides for many of our problems are identical with those of the biologists.

The AIBS and the Federation are very different in some respects. The Federation rather closely coordinates the activities and interests

of six societies including some 5,600 individuals. The AIBS does the same for some societies at the time of the annual meeting but the cost of this service comes out of registration fees of the meeting. AIBS plays, however, a much more important role in organizing various activities or studies and collecting data on behalf of all biologists on a scale that would be impossible for any society acting by itself. In this capacity AIBS represents twenty-one affiliate societies and twenty-four full member societies, with a total membership of some 80,000 biologists. Many societies, for example, including our own, have printed brochures to induce students to enroll in their particular specialty. AIBS can do this effectively with expert help for all the biological societies, and Government agencies are right in refusing requests to repeat such an expenditure for every biological society individually.

In many ventures it is most important for AIBS and the Federation to work closely together to avoid any sort of competition. Cooperation of this type depends solely upon the American Physiological Society for ours is the only society in the Federation which has recognized its indebtedness to biology by joining AIBS as a full member. Fortunately the Society for Experimental Biology and Medicine, with a nucleus of physiologists on its Council, has recently joined AIBS as an affiliate member and this brings into the Affiliate group some 40% of the Federation membership, while 60% of the members of SEBM are also members of the Federation.

Thus the American Physiological Society joins the American Institute of Biological Sciences not for the specific services which it renders to the business of our Society but rather because through AIBS we are enabled to participate in many important ventures which are too big for us to handle alone but toward which we continually feel a pressing responsibility -- things which we feel ought to be done for the good of our profession but for which we have neither the time nor the money.

Some of these public service undertakings have been described by President Dickson of AIBS in the AIBS Bulletin of last January. I need, therefore, only mention the biology curriculum study supported by the National Science Foundation, the preparation of biology teaching films supported by the Fund for Advancement of Education and the recently proposed comprehensive study of communications in biology supported by the National Science Foundation. AIBS owns and publishes the Bulletin and the Quarterly Review of Biology; it publishes a Symposium Series and translations of seven Russian biological periodicals and six monographs. It manages thirty-six grants or contracts with a total value of three-quarters of a million dollars, and through its committees it advises Government agencies in the spending of some 40 million dollars per year.

Not all of this activity is of any interest to physiology but enough of it is of such vital interest that it is well worth $1.00 per year to every member.

Those of us who helped to found AIBS did so with the conviction that some one organization in this country which could speak for all biologists was badly needed. It would serve biology as the American Chemical Society serves the chemists and as the American Institute of Physics serves the physicists. Thanks to the National Academy of Sciences and the National Research Council which nursed AIBS through its weanling years, we have now fairly realized that ideal. AIBS in its present form deserves the support of biologists. Only the strictly scientific, highly qualified professional societies are deemed acceptable as full members. To be sure much of what AIBS does is of no interest to the physiologists but much is also of vital importance to us. With a clear conscience one might venture to predict that in the long run AIBS would so far enhance the prestige of biologists and so much improve the understanding of biological research by the public that the salaries of biologists would be increased out of all proportion to the increased expenditure required for dues. This is a totally unworthy and undignified argument for joining AIBS but it is probably a fact nevertheless.

The AIBS is not a lobbying organization devoted to the selfish interests of its members. It is organized to serve biology as a profession and the benefit to the individual biologists is incidental. Its scientific dignity is well preserved in this respect and it actually enjoys at the present time a more favorable tax-free status than does the Federation, although we hope that the Federation will acquire the same status in the near future. The influence and prestige of AIBS are steadily growing and every year it is better fitted to serve the broad biological interests of physiologists.

AIBS interferes in no way whatsoever with the activities of any member society but often is able to offer some help. In that sense it is not an "umbrella" organization. The work of AIBS could not be done by the AAAS because that valuable organization is obligated to serve the whole field of science and cannot focus closely enough on any one field like biology. It could not be done by the Federation which is concerned with only a small fraction of biology. In our free country it cannot be done by the National Academy of Sciences which does not enjoy or have the responsibility to exercise the dictatorial powers of the Academy of Sciences in the USSR. The AIBS is now eleven years old. My own confidence in the organization has grown steadily throughout this period. I am proud that the American Physiological Society has the distinction of being the first society to join AIBS as a full member and I am proud to have been able to serve as the APS representative on AIBS since the day of its founding. I firmly believe that it has an important role to play in the future scientific life of the United States and I hope that the American Physiological Society will continue to support it by full membership.

Past-Presidents

Pictures have been obtained of all past-presidents of the Society. Those from 1888-1956 have been placed in composites of 10 each and framed (16" x 21") for display at Beaumont House. Copies of these composites in prints 11" x 14" are available for $10.00 per set. Several have been purchased for Departmental Libraries. Orders may be placed with the Central Office of APS.

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AMERICAN PHYSIOLOGICAL SOCIETY

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1888 AND 1891-1895

S.W. MITCHELL
1889–1890

R.H. CHITTENDEN
1896–1904

W.H. HOWELL
1905–1910

S.J. MELTZER
1911–1913

W.B. CANNON
1914-1916

F.S. LEE
1917-1918

W.P. LOMBARD
1919–1920

J.J.R. MACLEOD
1921-1922

A.J. CARLSON
1923–1925

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AMERICAN PHYSIOLOGICAL SOCIETY

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1926 – 1929

W. J. MEEK
1930 – 1932

A. B. LUCKHARDT
1933 – 1934

C. W. GREENE
1935

F. C. MANN
1936 – 1937

W. E. GARREY
1938 – 1939

W. T. PORTER
HONORARY 1938

A. C. IVY
1940 – 1941

P. BARD
1942 – 1946

W. O. FENN
1947

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1948

C.J. WIGGERS
1949

H.C. BAZETT
1950 APRIL-JULY

D.B. DILL
1950

R.W. GERARD
1951

E.M. LANDIS
1952

E.F. ADOLPH
1953

H.E. ESSEX
1954

W.F. HAMILTON
1955

A.C. BURTON
1956

SUMMER TRAINING PROGRAM FOR COLLEGE TEACHERS OF PHYSIOLOGY

Committee on Education, American Physiological Society

The program of summer traineeships in research laboratories will continue in 1960. Trainee awards are made to qualified teachers of physiology or dynamic biology in arts and sciences colleges. Support for this program is provided by the National Science Foundation and the National Heart Institute.

The program was started in 1956 and has been operating each summer. The Education Committee feels that the present program of research experience for teachers will not only serve to stimulate the college teachers but it should strengthen our profession in years to come. It is the purpose of the program to revitalize interest in the biological sciences which, if done, will surely stimulate some college students to choose careers in the biological sciences and to increase the number of graduate students. The educational aspects of the program are most important - training of teachers and in turn their training of college students.

The training awards range from $500 to $1800, averaging about $1200. These funds cover travel, extra maintenance costs and stipends. Each teacher is asked to submit a budget based upon the principle that in undertaking this training he would suffer no undue financial loss but would be able to maintain his usual standard of living. The period of training runs for two to three months. In several cases a second summer is approved. Some teachers desire to continue, at their own institution, work initiated during the summer. Even though the teacher's time for research there is limited in most cases, the utilization of students as assistants in whatever projects they undertake is proving to be a mutually stimulating experience. Initial support for such research in several instances is currently being given by small grants directly to the teachers from the National Institutes of Health and it is hoped such grants will continue to be available.

It is the hope of the Committee, and of the Council, that all members of the Society will take an interest in this effort to bring college teachers of our subject into closer relationship with research. To this end the Committee invites members as well as non-members situated in research laboratories to act as hosts for the college teachers. Those willing to accept one or more teachers in their laboratories for the summer of 1960 should communicate with Dr. Ray Daggs, 9650 Wisconsin Avenue, Washington, D.C., soon so that proposals can be formulated before November 30. Each year the Committee circulates a list of such proposals, together with application forms, to the Biology Departments of 700 colleges and in addition to approximately 800 individual biologists.

The Committee has agreed that the following principles should

be accepted by prospective host laboratories:

1. In the usual case teachers should have the opportunity to join a research director or group in active participation in research already in progress. Participation in a well-organized course at the graduate level is acceptable, for at least part of the work, if such a course is designed to train for later research work.

2. The research director or a member of his research group able to direct the work and training of the teacher should be present throughout the traineeship period, or at least until such time as the teacher has demonstrated his ability to continue on an independent basis.

3. The teacher should be considered as a co-worker and colleague rather than a research assistant or technician. If his work leads to significant results, worthy of publication, he should be granted co-authorship with his research director or group.

4. Proposals in any subdivision of our science may be considered, be it cellular, general, comparative, mammalian or medical physiology. Proposals to serve as hosts from Society members who work in college departments of physiology or biology are particularly invited. It will be very helpful if a description of the proposed research project, or graduate course, be sufficiently detailed so that the resulting abstracted list of proposals sent to the college teachers gives a clear picture of the nature of the work and opportunity for the teacher to make a wise selection, in keeping with his interests and previous training.

LABORATORY EXPERIMENTS PROJECT OF THE EDUCATION COMMITTEE

S. R. TIPTON

At the 1955 Workshop for College Teachers of Physiology held at the University of Connecticut it became apparent that new laboratory experiments were needed for the proper teaching of general physiology at the college level. A subcommittee of the Education Committee was formed to collect possible materials. In addition to the material collected from many individual sources the National Research Council Committee on Teaching of Biology has turned over to Louise Wilson, at Wellesley, some physiological material received in response to a general appeal. Although progress has been slow the collection continues to grow. It was quickly realized that the material coming in to the central depository at Wellesley would have to be screened, tested, revised, edited and in many cases rewritten before it would be suitable for circulation. From discussions with participants at the Bucknell University Workshop in 1958 it was apparent that many teachers preferred to have separate experiments rather than a laboratory manual or an organized source book. With separate experiments to select from, the teacher could make up his own laboratory course to suit his particular needs.

A grant was received by the Society from the National Science Foundation to test some of the newer experiments and to edit and revise them for distribution. The subcommittee composed of R. R. Ronkin, R. C. Sanborn, Louise Wilson and S. R. Tipton (all teachers of college physiology) reviewed all the material, eliminated most of the widely used traditional experiments and concentrated on newer material suitable for advanced undergraduates that was not too demanding in terms of specialized apparatus. Dr. Sanborn and his assistants tested the experiments in the teaching laboratory at Purdue University. The subcommittee spent approximately two weeks at Wellesley College this summer revising, editing and rewriting the tested experiments. The committee recognizes that these experiments are far from complete in coverage and that some of them may not be the newest and most satisfactory ones in use. The set will be a continuing one and as new material becomes available -- particularly in categories not already included, such as nutrition, bioluminescence, control and regulation, etc. -- it will be added to the list. It is essential for the success of the project that anyone who feels that he has newer or more useful material than what is now included should send it to Dr. S. R. Tipton, Univ. of Tennessee, Knoxville, so that it may be added to the file of experiments. The committee particularly is looking for experiments that recently have been brought from the research to the teaching laboratory.

The experiments have come from such diverse sources and have undergone such extensive revision that it is difficult to give credit where it really may be due. The committee therefore has not identified any experiment as coming from a particular individual or school. The committee also realizes that the need for good usable experiments for the physiological teaching laboratory has only just begun to be met and certainly expects the present list to increase until it includes experiments in most areas of general physiology. In the planning stage are 1) an issue of new experiments in the area of elementary human physiology selected from the collection being made by Charlotte Haywood at Mount Holyoke College; and 2) work on a series of experiments in systematic or so-called medical physiology.

The annotated list of experiments in general physiology given below is being circulated to undergraduate colleges and teachers of general physiology. The detailed experiments may be procured in mimeographed form from Dr. Ray G. Daggs of the central office of the American Physiological Society for the cost of reproduction and mailing.

TITLES AND DESCRIPTION OF EXPERIMENTS

(Price for entire set - $1.30)

CELL CHEMISTRY

(28 sheets in set - $0.40)

A. Isolation and study of subcellular particles

1. Isolation of nuclei and mitochondria from rat liver

Detailed procedures for isolation of nuclear and mitochondrial

fractions of rat liver are given. The experiment includes brief suggestions for identification of the particles by staining reactions and several suggestions to the instructor which should be of help in the whole series of experiments on subcellular particles.

2. Isolation of bee muscle sarcosomes (mitochondria)
   Detailed procedure for isolation of sarcosomes from flight muscles of the bee giving a preparation for use in experiments on the study of mitochondria.

3. Isolation of fly muscle sarcosomes and study of their properties
   Detailed procedure for isolation of sarcosomes from the flight muscles of flies giving a preparation for use in experiments on the study of mitochondria. The experiment includes suggestions for microscopic study and staining reactions of the particles.

4. Enzymatic properties of mitochondria (succinic acid oxidase system)
   Procedures are given for the determination of succinoxidase activity in a mitochondrial suspension by measurement of the rate of oxygen consumption using the Warburg microrespirometer apparatus, and succinic dehydrogenase activity by dye reduction.

5. Enzymatic properties of mitochondria (cytochrome oxidase)
   Procedures are given for the determination of cytochrome oxidase activity by measurement of rate of oxidation of reduced dye, and alternatively by the measurement of the rate of oxidation of reduced cytochrome using the spectrophotometer.

B. Titrimetric and manometric analysis of the decomposition of hydrogen peroxide by catalase
   This experiment uses catalase as an example for studies of enzyme kinetics, involving the effect of temperature, enzyme concentration, substrate concentration, pH and inhibitors. Procedures use the eudiometer and the Warburg apparatus.

C. Progressive development of enzyme systems: tetrazolium visualization of dehydrogenase activity
   Insect embryos treated with neotetrazolium chloride are observed microscopically and grossly, to determine sites of dehydrogenase activity.

D. Spectroscopic study of reduced and oxidized cytochrome
   Absorption bands of cytochrome are observed in yeast cells with the spectroscope under aerobic and anaerobic conditions, and in the presence of respiratory inhibitors.

E. Relation of substrate concentration and rate of reaction

Succinic dehydrogenase from liver homogenate of the rat is assayed by spectrophotometric reduction of oxidized cytochrome to determine the variation in the rate of cytochrome reduction in the presence of various concentrations of sodium succinate.

F. Phosphate turnover in animal tissues (measured by radioactive phosphate)
The turnover of radioactive phosphorus in inorganic phosphate, phosphate sugar, phospholipid and nucleoprotein fractions of the liver of rats and of frogs. A method for determination of tissue phosphorus is included.

EXCITATION
(27 sheets in set - $0.40)

A. Suggestions to the instructor for electrophysiological experiments
A detailed description of the component parts of an experimental arrangement for measuring bioelectric potentials, including stimulators, pre-amplifiers, oscilloscopes, electrodes, choice of animal preparations and many other valuable suggestions about sources and use.

B. Suggestions to students doing electrophysiological experiments
Valuable details in the use of oscilloscopes and stimulators are given for the use of students working in the laboratory.

C. Injury and resting potentials in muscle
Procedure for measuring the resting potential and the injury potential of frog muscles is given in detail.

D. Electrophysiological properties of the frog sciatic nerve
Procedures are given for determining the threshold, magnitude and form of the action potential in the sciatic nerve of the frog. Methods for measuring the conduction velocity of the nerve impulse and the strength-duration curve for a nerve are also described.

E. Central nervous system of the cockroach
In this experiment the ventral nerve cord is exposed and prepared so that spontaneous activity, giant fiber response, synaptic transmission and the sensitivity of synaptic transmission to chemical treatment can be recorded. The general apparatus in (A) are sufficient for the measurements.

F. Central nervous system of the crayfish
Procedures are given for the recording of spontaneous activity and single giant fiber response in the ventral nerve cord of the crayfish. This experiment is very similar to (E), except that a different species is used.

G. Afferent activity in the crural and cercal nerves of the cockroach
Procedures are given for preparing the cockroach nerves for re-

cording afferent activity so that sensory discharge and afferent pathways in the central nervous system may be studied.

H. Earthworm ventral nerve cord - giant fibers
This experiment describes a preparation in which the giant fibers and the electrical components of sensory activity in the ventral nerve cord of the earthworm can be studied. The experiment is basically similar to (E) and (F) above.

I. Analysis of taste in flies by the acceptance threshold method
A method is described by which the threshold of flies for sucrose, various alcohols and other organic compounds is tested by their acceptance or rejection, in what is called the acceptance threshold method.

RESPIRATION
(13 sheets in set - $0.20)

A. Oxygen consumption by the Warburg method
The general detailed procedure for measuring oxygen consumption with the Warburg microrespiration apparatus.

B. Measurement of the adaptation of yeast to galactose
The effect of added glucose, or galactose, on the respiration of glucose-grown yeast is compared with the effects of these substrates on galactose-grown yeast to demonstrate the adaptive response of some yeast enzymes. The respiration is measured with the Warburg microrespirometer.

C. Oxygen consumption by cells: effects of added substrates
The rate of oxygen consumption of yeast in a medium with no substrate is compared with that of a yeast suspension in a medium to which sodium acetate is added. The respiration is measured with Warburg microrespirometer.

D. Measurement of the oxygen consumption of tissue slices and tissue homogenates
A comparison of the rate of oxygen consumption of tissue slices of rat liver and that of liver homogenate demonstrates the essential role of the cell organization in the respiration of the cell. The loss of soluble factors by dilution in the homogenate is emphasized.

E. Effect of oxygen tension on metabolism and breathing rate (Winkler method)
The standard Winkler procedure for dissolved oxygen is used to study the dependence of the oxygen consumption of a fish upon oxygen tension of water. Micro and semi-micro adaptations of the Winkler method permit its use with a variety of smaller aquatic animals and plants.

EXCRETION
(2 sheets in set - $0.05)

A. Transport by the kidney tubule
A method is described for the isolation of kidney tubules from the shad roach. The procedure for the determination of the influence of low temperature and dinitrophenol on active transport of phenol red by the tubules is described.

MOTION
(6 sheets in set - $0.15)

A. Models of muscular contraction: the glycerinated muscle fiber and the actomyosin thread preparations
Procedures for the preparation of glycerinated muscle fibers and the isolation and preparation of actomyosin from rabbit muscle are described in this experiment.

B. Amoeboid movement: movement and phagocytosis in human leucocytes
A method is given for isolation of human leucocytes and the observation of phagocytosis of starch granules.

C. Some histochemical and optical properties of insect muscle
Study of different muscles from various kinds of insects with the polarizing and ordinary light microscopes.

HORMONES
(8 sheets in set - $0.15)

A. Endocrine control of growth in insects - puparium formation in Diptera
The circulation and action of hormones controlling puparium formation is demonstrated in fly larvae by means of appropriately placed ligatures.

B. Control of chromatophores in the Fiddler Crab, Uca sp.
Chromatophore response is observed in the Fiddler Crab after removal of the eyestalks, and after injection of the extracts of the eyestalk in crabs in which the eyestalks have been previously removed.

C. Control of color changes in the frog by chromatophores
This experiment demonstrates chromatophore response to white and black backgrounds in frogs after removal of the pituitary gland, and subsequent re-injection of extracts of the pituitaries.

D. Regulation of oxygen consumption by the thyroid gland
Procedures for measurement of oxygen consumption by a simple method are given and its application to rats, after thyroidectomy and after treatment with thiouracil is described.

OSMOREGULATION
(3 sheets in set - $0.10)

A. Measurement of osmotic concentration by comparison of melting

points, by plasmolysis, and by hemolysis; the demonstration of osmoregulation in the crayfish
The title is rather descriptive of the contents of this experiment. The students calculate isotonic coefficients for a number of substances and study the ability of the crayfish to regulate its blood osmoconcentration.

PERMEABILITY
(8 sheets in set - $0.15)

A. Penetration of phosphorus into yeast cells
Indicates the effect of substrate on the incorporation of radioactive phosphorus into yeast cells.

B. Permeability of erythrocytes of various species to glycerol
The rate of hemolysis of erythrocytes of different species in 0.3 M glycerol, and the comparative rates of penetration of a series of substances are determined by means of a reflectometric densitometer, or a photoelectric colorimeter.

C. Penetration of P^{32} into erythrocytes
The penetration of radioactive phosphorus into avian or mammalian erythrocytes over a period of 40 minutes is determined.

D. Active transport of sodium through frog skin
This experiment concerns the active transport of sodium through the frog skin. With the skin arranged in an "Ussing cell" and the physico-chemical forces tending to move ions across it reduced to zero by an applied potential, the active transport of sodium can be measured. The student is asked to design an experiment to show that sodium is actively transported.

INTERNATIONAL ORGANIZATION OF PHARMACOLOGISTS

At the XXI International Union of Physiological Sciences (IUPS) held in Buenos Aires in August 1959, a Section on Pharmacology of the IUPS was created and empowered to arrange for symposia, conferences and congresses and to carry out fellowship programs as well as other activities which will contribute to the advancement of pharmacology. An organizing meeting of the new Section was held on August 11. It was decided to build the new Section around the already existing International Council of Pharmacologists, which contains one representative of each nation or region that adheres to the IUPS. The following executive committee was elected: President, Carl F. Schmidt, (USA); Vice President, S. Anitchkov (USSR); Secretary, D. Bovet (Italy); Treasurer, D.M. Aviado (USA).

ELECTRICAL AND MECHANICAL EVENTS IN THE FROG HEART

A DEMONSTRATION FOR TEACHING

PAUL R. GROSS

The time-honored demonstration of spontaneous electrical activity in the frog heart, now largely abandoned in undergraduate courses in general physiology, has been found, with some technical up-dating, to have distinct advantages over seemingly more pertinent demonstrations of bioelectric events in nerve and in skeletal muscle. The primary advantages are simplicity of apparatus, absence of stimulators and exceedingly long life of the preparation. Equally important, but certainly less explicable, is the enthusiasm of students, a response less generally observed when one demonstrates a delicate and difficult intracellular recording from nerve or muscle.

Perhaps in the latter case the virtual invisibility of the biological preparation coupled with an immodest display of electronics and micromanipulators frightens the undergraduates, or impresses them to be the extent that their normally irrepressible curiosity is paralyzed.

Of course, where conditions permit, both kinds of demonstration can be given with profit. The one described herein has been used in courses in general and cellular physiology at University College in New York University for the past four years. It represents a compromise respecting several conflicting conditions: limitation of time for demonstrations, a desire to have undergraduates understand as much as possible of the principles governing the operation of the apparatus, an inclination toward demonstrations which can be observed for more than two minutes without boredom, and the necessity for sufficient ruggedness in the equipment to withstand vibration, nudging and exploratory dial-twiddlings.

The demonstration follows a section of the course in which the physiology of muscle and nerve is discussed. Cardiac physiology is discussed only superficially, for I believe it to be germane to mammalian and comparative rather than to cellular physiology. The heart is then chosen because it makes possible the demonstration, in a single experiment (and without excessively fragile or expensive equipment), of electrical activity coupled with muscular contraction, rhythmicity and automaticity and the temporal relations between the passage of an excitatory impulse and the appearance of mechanical changes. The details of the complete "electrocardiogram" are not primarily considered nor displayed although, as will be shown, it is a simple matter to obtain very stable ECG's of a special type with the apparatus employed. An annotated equipment list follows:

1. A cathode-ray oscilloscope, with provision for driven sweep and a low sweep rate of 2/second or less. For observation of the complete electrocardiogram, terminals should be provided for inser-

tion of external capacitance to reduce the sweep rate to about once in five or ten seconds. The driven sweep is an absolute requirement since, without it, the asynchrony between a recurrent sweep and the beating heart results in bewilderingly complex patterns. With the driven sweep and suitable sync. amplitude adjustment, the heart itself initiates each sweep of the beam. In our laboratory a Dumont type 304-A instrument is used for this demonstration.

2. A good AC preamplifier. An AC instrument is specified because direct-coupled amplifiers are very expensive and may suffer from certain types of instability. The amplifier must have a balanced input. We have used a Grass type P4-A preamplifier which has both balanced and single-ended inputs and outputs. The push-pull input facility is necessary, since it is here that noise and hum from the power lines can make impossible the recording of small biopotentials. A good amplifier will discriminate against in-phase noise and hum signals, making possible an open, unshielded preparation, visible even in a large lecture room or laboratory.

3. A high-fidelity audio amplifier. "High-fidelity" is specified only because the electrical components of the cardiac cycle include signals of low frequency. These are well within the limits of linearity of the laboratory-type preamplifier, but may not pass a poor audio amplifier; the audio instrument should be capable of handling signals in the 50-200 cycle range without serious attenuation. Almost any recent commercial audio amplifier will do. We have used with success a Lafayette Radio Co. LA/90, with its two fifteen watt channels paralleled. This instrument is particularly useful because its two channels can be separated for special techniques employing an additional low-impedance recording device. Equally successful have been kit-built amplifiers such as an "EICO" HF-20 and a little 10-watt "ARKAY", now retired from this service. The output power is not important; what is needed is good low-frequency response and reasonably high gain. The latter is easily obtained from a small amplifier if the record-compensating networks are cut out of the "magnetic phono" input.

4. A well-baffled speaker. Here the emphasis is on the baffle, for even the best amplifier-speaker system will not reproduce the low-frequency components of the signals if the speaker is not properly enclosed. The speaker itself need not be an expensive one, and unnatural resonances in the 50-120 cycle region are almost an advantage, for we do not require a high-fidelity rendering of the electrical waveform, but rather a good loud sound (necessarily of low pitch) simultaneous with each transient picked up from the heart. In use in our laboratory is a nine-dollar 12-inch PM speaker, enclosed in a baffle made by cutting an 11-inch circle in the front of the demonstration table. This arrangement is a kind of "infinite baffle" which, while producing horrendous effects with voices and music (and thus discouraging such utilization of the system), makes a beautiful sharp crack simultaneous with the downstroke of the Q-S complex.

5. A supply of shielded cables, one and two-conductor, plugs,

jacks and other connectors and some lamp-cord for the speaker connections.

6. A kymograph and a heart lever, with necessary clamps, supports, etc.

7. Two Ag-AgCl electrodes. These are prepared by passing a few milliamperes of current between short lengths of fine (less than 0.5 mm.) silver wire immersed in 1% NaCL until the electrode(s) being coated are a pearly blue-gray color. The silver wires should be coiled a few times, and the end of one should be sharpened before coating. The sharpened Ag-AgCl electrode serves both as the active, "intramural" electrode and as a hook linking the ventricle to the lever system.

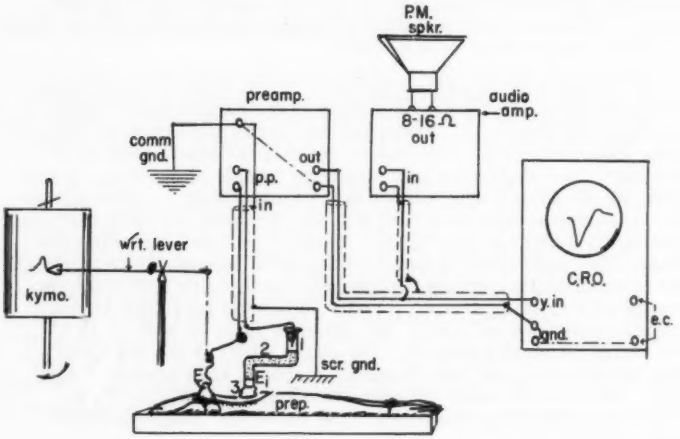

Fig. 1. Block diagram of components in apparatus used to demonstrate electrical-mechanical activity in the frog herat. "kymo": kymograph drum. "wrt. lever": light, counterweighted heart lever. "prep.": preparation. "E": active electrode. "E_j": reference electrode assembly with 3: cotton wick saturated with Ringer's, 2: agar-KCl bridge, 1: KCl solution. Coils of E and E_j are Ag-AgCl. "scr. gnd.": screen ground. "comm. gnd.": common earth ground. "p.p." push-pull input. "e.c.": external capacitance terminals.

The arrangements are shown schematically in figure 1. The active electrode, E, impales the very tip of the ventricular apex (the frog has of course been pithed or anesthetized). The electrode is coiled two or three times above the hooked end, and this coil leads off through a flexible wire to one side of the preamplifier input. The coil itself is attached to a thread which pulls on a conventional heart lever, which writes, in turn, on the kymograph drum. The design of the electrode

causes it to damp somewhat the motion of the lever, so that sufficient lever length should be provided for suitably large deflections. E is paired with electrode E_i, the "indifferent" electrode (which is, of course, not really indifferent). E_i is a doubly-elbowed glass tube, filled in section 2 (fig. 1) with saturated KCl-agar. At the preparation end, a large cotton wick contacts the agar and the visceral mass; the wick is soaked in Ringer's. At the input end, the agar is layered with some saturated KCl solution, into which the second Ag-AgCl electrode dips. This is in turn connected to the other side of the balanced input to the preamplifier. E and E_i enter, as close to the preparation as possible, a length of shielded cable running to the preamplifier, and the shield is connected at the preparation end to a piece of copper screen (scr. gnd.) upon which all the components rest. The other end of the shield is grounded at the common ground post of the preamplifier, and this is the only earth ground. All local grounds are made to the screen.

The input leads are connected push-pull to the first stage of the preamplifier, where the signal is amplified to drive the audio amplifier and the vertical amplifier in the oscilloscope.

Single-ended output is chosen from the preamplifier to the remainder of the circuit. A shielded cable carries the output signal to the audio amplifier and the Y-axis terminals of the 'scope. If the preamplifier has enough gain, the audio amplifier need not have much and connection can be made to the "auxiliary" or "crystal" input. If the preamplifier has low gain (or high distortion at high gain), the "magnetic phono" input of the audio amplifier will have to be used, with its additional stage of amplification and any "compensating" networks removed for best results.

The instructions of the preamplifier manufacturer must be followed with respect to output loading; these will vary with the instrument used but, generally, the output end should "see" a combined impedance of more than 50,000 ohms.

The audio amplifier feeds a speaker whose impedance matches that on the output transformer tap provided.

In parallel with the audio amplifier is the cathode-ray oscilloscope (CRO). Connection is made as shown between the Y-axis amplifier input and ground. This 'scope ground is shown connected internally to a ground in the sweep circuit; between this and the "ext. cap." terminal one can insert enough capacitance (usually about 20 mf) to lengthen the sweep time for recording the complete electrocardiogram, or several cycles thereof. For this application, deviations from linearity in sweep are not important.

One additional item is needed: a flask filled with Ringer's. With this solution, the heart should be kept wet but not flooded. This is the only precaution needed to keep the preparation active for an entire day, provided only that reasonable care has been used in the original exposure of the heart.

All connections are, of course, made prior to preparation of the frog. The circuit is tested by turning the CRO and amplifiers on and after a warm-up period, touching one of the electrodes. This should produce a loud buzz in the speaker and a 60-cycle pattern on the CRO face.

The usual precautions in handling high-voltage equipment should be observed, although the system described is quite safe at all accessible points.

When the frog has been prepared, the animal is brought beneath the electrodes, E pushed gently through the extreme tip of the ventricular apex, and the wick of E_i fixed in place. The gross effects of the insult to the myocardium pass off in a few minutes, whereupon the lever begins to write an ordinary two- or three-phase record. The lever should be so weighted as to raise the heart free from surrounding tissue; if this is not done, the potentials are short-circuited and difficulties are encountered.

Once the mechanical record is satisfactory, the CRO sweep is adjusted to bring the desired portion of the ECG onto the tube face.

In our own laboratory, the CRO is adjusted initially to bring the negative Q-S complex to sufficient amplitude and width to fill the entire 'scope face; optimum adjustment of the preamplifier and Y-axis amplifier gain will eliminate all detectable ripple due to 60-cycle hum.

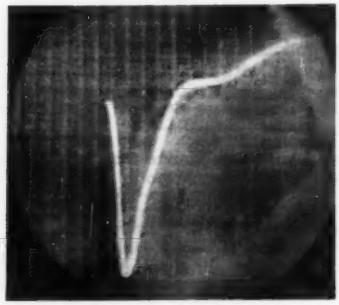

Fig. 2. Complex recorded by unipolar lead impaling tip of ventricular apex. Peak of negative deflection, about 15 mV, entire transient (isoelectric line to run-off on tube face); about 0.3 sec. duration

The sharp, negative Q-S complex thus selected is shown in Figure 2, which was photographed in ordinary room light by holding the camera shutter open through five successive cycles. The camera was a 35mm. Exakta, fitted with a 50mm. Zeiss Tessar, f 2.8, and loaded with Kodak Plus-X film. The good stability of the pattern is evidenced by the sharpness of the trace photographed under these less than optimum conditions.

When the CRO display is satisfactory, the audio amplifier controls (gain, bass, treble) are adjusted so that the speaker produces a loud, clearly-differentiated thump simultaneous with the display of the transient. When this is done, two sounds will be heard, one louder and relatively higher-pitched, corresponding to the deflection of the beam on the 'scope, and another, coming between these peaks, somewhat lower in pitch and not as loud. This second sound is produced by the T-wave and associated complexes, which are not initially displayed.

In the classroom, the demonstration is given thus: the students are told at once that the sounds they hear are not heart sounds of the usual kind (they resemble the human heart sounds quite accidentally), but that rather they are an audible record of the electrical activity visible on the CRO and led off from the heart. The arrangement of the circuit is then discussed with the aid of a diagram much like figure 1 and in sufficient detail so that every student knows at least what each piece of equipment does, if not exactly how. Their attention is then directed to the visual display and the sounds. After a very few cycles, they can identify very clearly the sharper of the two sounds with the electrical transient displayed on the CRO. The identity of this transient with a wave of depolarization arriving in the vicinity of the active electrode is discussed while the visual-aural information is being stored centrally.

Now the students are asked to turn their eyes away from the 'scope altogether and to examine, instead, the record being written by the lever, while listening to the sounds. In a few seconds, almost every student has made the same observation; i.e. that the louder noise, and hence the arrival of the depolarization wave, precedes by an extremely short interval the full development of the ventricular contraction. This is the major physiological lesson of the demonstration, i.e. electrical excitation of muscle is the normal mode of initiation of mechanical changes in the contractile machinery. But it is not the only lesson.

After the initial period of watching has passed (along with such questions as "how long will this thing last?" and "is the frog still alive?"), the time has arrived for an explanation of the relation between the electrical transient displayed and an "action potential". The crude nature of this electrical variation, partially intramural and partially surface, is stressed, as is the inevitability of injury at the site of the electrode. Differences between this and potentials on and in single cells are touched upon, as are differences between this and an ordinary surface electrocardiogram. The students are alerted as to what about the record is significant and what is not. At this point, the weaker students will have begun to depart (physically, if permitted), but the others, by whose virtue teaching is the most rewarding of duties, will press for more detail about the electrocardiogram.

Now one should connect an external capacitance to the 'scope to slow the sweep; with adjustment of sync. amplitude and gain, one or more cycles of the complete ECG can be made to appear on the CRO and this will also continue stably for hours, if necessary.

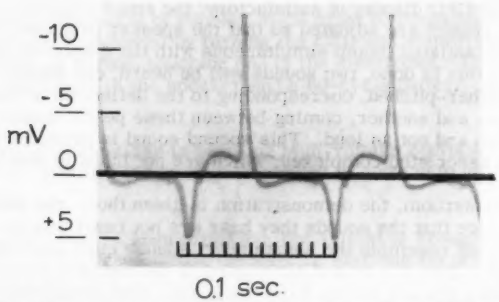

Fig. 3. Two cycles of electrocardiogram recorded from unipolar lead impaling apex. Indifferent electrode on ventral visceral mass. 25°C. Rana pipiens. Photographed from CRO face on Polaroid transparency film and printed directly from transparency. Isoelectric line traced by beam with Y-axis amplifier turned off and then retraced with black ink to improve contrast. Record made four hours after exposure of heart and insertion of electrode.

Two cycles from such an ECG are shown in figure 3. This record was obtained from a preparation which was four hours old. The temperature was 25°C, the animal Rana pipiens. The record represents one sweep recorded on Polaroid transparency film. The figure is a negative printed from the positive transparency.

When students begin to press for an explanation of the reversed polarity of the smaller, secondary wave, the time has come to do one of several things, depending upon the inclinations and energy of the instructor:

1. Call a halt and dismiss the class.
2. Propose a conference on the subject for some future date.
3. Call home and say that you will be late for dinner, and then begin the explanation.
4. Devote the very next lecture to electrocardiography.

My own choice is, however, the fifth:

5. Point out that the intimate details of such records are a) outside the immediate interest of a course in cellular physiology, but b) are nevertheless matters of fundamental interest and c) of contemporary research. Refer those interested, therefore, to a good, contemporary reference on the electrophysiology of the heart, such as the volume edited by Hecht (1957) and go home to dinner.

REFERENCE

HECHT, H.H. (consulting ed.). The electrophysiology of the heart. Ann. N.Y. Acad. Sci., 65: 653-1146, 1957.

THE CARE AND USE OF ANIMALS

The suggestion has been made to the APS Committee on the Care and Use of Animals that some physiologists may be performing experiments on animals without the use of proper anesthetization. Such inexcusable procedures are, of course, contrary to the "Guiding Principles in the Care and Use of Animals" which has been approved by the Council of the American Physiological Society. The Committee feels that this may be an appropriate time to publicize and re-emphasize the "Guiding Principles" in hope that such practices as those referred to above may be discouraged. The Committee suggested that the "Guiding Principles" be published in THE PHYSIOLOGIST along with the reminder that:

1. Adherence to the "Guiding Principles" is an obligation of membership in the Society.

2. Articles based on experiments violating the "Guiding Principles" shall not be acceptable for publication in the journals of the Society.

(Copies of the "Guiding Principles" as printed below are available on request.)

GUIDING PRINCIPLES IN THE CARE AND USE OF ANIMALS

(Approved by the Council of the American Physiological Society)

Only animals that are lawfully acquired shall be used in this laboratory, and their retention and use shall be in every case in strict compliance with state and local laws and regulations.

Animals in the laboratory must receive every consideration for their bodily comfort; they must be kindly treated, properly fed, and their surroundings kept in a sanitary condition.

All major operative procedures must be done under a general anesthetic; minor operative procedures may be done under local infiltration anesthesia. If the nature of the study is such as to require that the animal survive, acceptable technic must be followed throughout the operation. If the study does not require survival, the animal must be killed in a humane manner at the conclusion of the observations.

The postoperative care of experimental animals shall be such as to minimize discomfort during convalescence. All conditions must be maintained for the animal's comfort in accordance with the best practices in small animal hospitals or in accordance with the practices followed in human medicine and surgery.

When animals are used by students for their education or the advancement of science such work shall be under the direct supervision of an experienced teacher or investigator. The rules for the care of such animals must be the same as for animals used for research.

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Director of Laboratory

THE WILLIAM T. PORTER FELLOWSHIP

J. M. BROOKHART

The William T. Porter Fellowship of the American Physiological Society is designed to encourage promising young scientists to engage in physiological research and to facilitate continuance of their training. The Fellowship is supported by funds from the Harvard Apparatus Company, and is awarded to an applicant chosen by a committee appointed by the Council of the Society. The current members of the Committee are T. C. Ruch, H. Rahn and J. M. Brookhart, Chairman.

Over the past few years the availability of funds for pre- and postdoctoral research fellowships has changed radically because of the great increase in the number of such fellowships sponsored by the various federal government programs. One of the results has been that the number and apparent quality of the applicants for the Porter Fellowship has undergone serious deterioration. In recognition of this fact, the Council has asked the Committee to recommend changes in the Porter Fellowship arrangements which would increase its attractiveness to superior young investigators seeking financial assistance. The Committee has made, and the Council has approved, the following revisions of the Porter Fellowship characteristics.

Because of the ready availability of postdoctoral fellowships from other sources, the Porter Fellowship will be available only to predoctoral students. In order to assure a degree of continuity of support, the Porter Fellowship will be awarded for either a one- or a two-year period. Preference will be given to those candidates who are in the final stages of their predoctoral training. The Porter Fellowship will be available to candidates who are not citizens of the United States of America. The annual stipend remains unchanged at $3600 and the time allotted for gaining experience in teaching remains at 40% maximum.

It is the hope of the Committee and the Council that these changes will encourage an increased interest in the William T. Porter Predoctoral Fellowship as a mechanism to assist able young students in the development of careers in physiology. The Committee would be grateful for suggestions from the members of the Society concerning further improvements in either the attractiveness or the administration of the Porter Fellowship.

Below is reproduced the official announcement of the Fellowship which has been mailed to departments of physiology and interested individuals.

THE WILLIAM T. PORTER FELLOWSHIP

Applications for the William T. Porter Fellowship are invited from predoctoral students engaged in training and research in any branch of Physiology.

The Fellowship will be awarded for a one- or two-year period. Preferential consideration will be given to those applicants who are in the final period of their training.

The applicant may plan to continue his studies in his present location or in another laboratory. The applicant may plan to spend up to 40 per cent of his time acquiring teaching experience. United States citizenship is not required.

The annual stipend is $3600. The William T. Porter Fellow may accept only such additional compensation (tuition, fees, modest stipend) as agreed upon by his sponsor.

Selection is made by a committee appointed for that purpose by the Council of the Society.

Applications must be made on or before January 10 of each year for the following academic year beginning July 1 or September 1. Announcement of the award will be made by April 1 of each year.

Application forms may be obtained from:

American Physiological Society
9650 Wisconsin Avenue
Washington 14, D.C.

EXCHANGE PROGRAM FOR SCIENTISTS

An agreement on the exchange of scientists has been reached between the National Academy of Sciences of the USA and the Academy of Sciences of the USSR.

Pertinent points of the agreement are listed below.

"The National Academy of Sciences of the USA and the Academy of Sciences of the USSR will send approximately 20 persons each from among prominent American and Soviet scientists (at least one-half of whom are to be members of the respective Academies) during 1959-1960 to deliver lectures and conduct seminars on various problems of science and technology as well as for the purpose of studying research work in progress in the USA and the USSR.

"The National Academy of Sciences of the USA and the Academy of Sciences of the USSR in 1959-1960 will organize, on a reciprocal basis, visits of American and Soviet scientists to acquaint themselves with research conducted in the USA and the USSR.

"The National Academy of Sciences of the USA and the Academy of Sciences of the USSR agree to exchange scientists in 1959-1960 for conducting scientific research and for specialization for periods of up to one year.

"In all cases, the sending side will defray the travel expenses of its scientists to and from their main destination.

"The receiving side will defray travel expenses within its country if these expenses are directly connected with the purpose of the visits provided for in this Agreement.

"The receiving side will provide, free of charge, to the scientists of the other Academy who have arrived on the basis of this Agreement, living quarters (hotel accommodations or rooms) and medical aid. Scientists' salaries (stipends) will be paid by the sending side.

"The receiving side will defray the expenses connected with the acquisition of materials, apparatus, literature, photocopies, microfilms, etc., within the program of work agreed upon for the visiting scientists".

Preferable visits of scientists of the National Academy of Sciences of the USA to study research work conducted in the USSR that are listed that may be of interest to members of the American Physiological Society are:

Structure and synthesis of nucleic acids; physical chemistry of proteins - 1 person for 1 month

Microbiology and cytology - 2 persons for 1 month

Physiology and biology of the nervous system - 1 person for 1 month

Biochemistry of cancer - 2 persons for 1 month

Organ and tissue transplantation - 1 person for 1 month

Limnology - 1 person for 1 month

Epidemiology and control of influenza - 1 person for 1 month.

Visits of scientists of the National Academy of Sciences of the USA to conduct research and specialized scientific work in the USSR that are listed that may be of interest to members of the American Physiological Society are:

Conditioned reflexes (especially of primates) - 1 person for 5 months

Physiology of stress (environmental and emotional) - 1 person for 5 months

Physical chemistry of high polymers - 1 person for 6 months

Further information concerning this exchange program can be secured from the Division of Biology and Agriculture, National Academy of Sciences, 2101 Constitution Avenue, Washington 25, D.C.

PHYSIOLOGIST - POET

Dr. Frederick Haven Pratt (1873-1958) who had been a member of the American Physiological Society since 1919 was a well-known physiologist who taught physiology at Harvard, Wellesley, Boston and Buffalo. Few people knew that he also was a poet. Two of his poems depicting part of his wide range of interest recently came to our attention.

PALOMAR: EVENING

Guard well the gates of night, O Palomar:
Your radiant crown darkens against the sky;
Dread voices in a far antiphony
Press nearer to the dome's reverberant height
Through aisles undreamt, from portals infinite.

Late glows the cast of day's full-rounded mold--
But what, ah! what shall breathless night unfold?
Dusk, with her veil, feigns now the Magyar's crown
(A thousand years, and still its cross bent down)--
Pause at the masque of night, O Palomar!

The following is an unfinished poem written during Dr. Pratt's later years.

CHLOROPHYLLIS*

What seest thou else
in the dark backward and abysm of time?---The Tempest I,2

I brought new wonder to a world grown old,
Where flood-lands in their silent mist lay deep
Beneath the walls unnumbered years had wrought--
Scars of the wind, of torrent, ice and sea.
The spark I nursed was dim, inconstant, cold;
The flame it lit, nearer to death than sleep,
Until at dawn a wavering gleam had caught
From night's abyss the stars' tranquillity.

And now the fields, fresh rimmed by willows pale,
Renew the promise that a year fulfills,
Or man shall turn from hunted man to fight
The engulfing dust, blind in his last despair.
Nor can the wings of my far ranging fail
The woods' kind refuge, or the quiet hills;
For they have left the alpine snows alight
With twinkling bloom, and the wild desert fair.

Over the shallows rippled in the flow
Of vagrant tides my jewels yet are strewn.
From the dead rock you draw my hidden stores
Surcharged with fate: tame to its pulsing power
Mountain and void are pierced; while far below
Echo the voices of a bell, in tune
With thunder and the lash of surf on shores
Where fear waked fear--lo, hour goads fleeing hour!

Drear were the ages Earth must wait to see
My clustering children, legion of the Sun
That bright in ageless youth still bound, yet free,
Led through the dawn their footsteps one by one.

F H P
1949

*Note--"Photosynthesis easily ranks as the leading wonder of the world."---Nature and development of plants, Carlton Clarence Curtis, 1907.

SPRING MEETING 1960

The Federation Meetings will be held in Chicago, April 11-15, 1960. Sessions will start at 9:00 A.M. Monday morning and run through Friday afternoon. Note that sessions will start Monday morning instead of Monday afternoon as in the past. This extra half day is necessitated by the increased number of ten-minute papers.

Abstracts of papers to be presented must be submitted on special forms which are being mailed to members along with other information. The Chicago hotels have assured the Federation that rooms will be provided at the price confirmed to the individual. The registration fee probably will be $10.00.

The rules of the Federation state that the deadline for receipt of abstracts is December 31, 1959. Abstracts received on or after January 1, 1960 will not be accepted. Note that postmark date does not count, receipt date must be before January 1. The abstract forms must be submitted as stated in the accompanying directions. If abstracts must be retyped before publication the author (Sponsor) will be charged $5.00. Abstracts sponsored by members of the American Physiological Society are to be sent to Dr. Ray G. Daggs, 9650 Wisconsin Avenue, Washington 14, D.C.

The special rules of the Physiological Society state that a member can be responsible for (Sponsor of) only one abstract. He can sign only one abstract. This means he can give the paper himself (thus be his own Sponsor), or sponsor a non-member, or be the sponsor of a paper of which he is a co-author. The sponsor of the paper signs the abstract. Abstracts of "Papers Read by Title" will not be printed.

PROGRAMMING EXPERIMENT

The Federation has a grant from the National Science Foundation and cooperative assistance from Remington-Rand Corporation to determine the feasibility of programming the Spring Meetings by machine methods. With the large number of ten-minute papers and the very limited time for programming, it has become increasingly difficult to build good sessions and attempt to avoid conflicts of interest.

Under the present system, after the individual society sessions are programmed there is no time to correlate individual society sessions with those of other societies. There are many times when different society sessions of similar content are scheduled simultaneously. One way to avoid this would be to have a completely integrated Federation program, i.e. all papers of one specific area of interest would be grouped together no matter what the society of origin. Each paper would be marked as to its society of origin as is now the case with papers transferred from one society to another.

The 1960 Spring Meetings will be programmed in the usual way

by the secretaries of the various societies and also in an integrated fashion for the whole Federation by a machine method (UNIVAC). There will be a check list of definitive categories (possible session titles) sent with each abstract form. Authors are to use this check list in defining the contents of their abstracts. Thus in a sense the author will determine in what session his paper will be scheduled. From coding on tape the UNIVAC will select papers of similar content to be placed in separate sessions. It will also provide a complete subject index. A comparative check will be made of the two methods and the sessions for 1960 will be programmed in accordance with the findings of this study by the secretaries. If it is determined that the integrated program is satisfactory it may be used in whole or in part. The APS members at their business meeting in Urbana voted to accept a completely integrated Federation program if it proved feasible.

The results of this comparative study will be made known to the members some time after the meetings. It may of course turn out that the machine programming will need some final human adjusting before printing for it is conceivable that machine errors will creep in. An example of such a machine error in interpretation of meaning of words was cited, I believe, in the London Daily Telegraph. An electronic translating machine was given the phrase, "The spirit is willing, but the flesh is weak" to translate into Russian. The resultant Russian version was given to an expert linguist to convert back into English. It read, "The whiskey is agreeable, but the meat has gone bad".

REQUEST FOR PHOTOS FOR CAREER BROCHURES

The Education Committee under a grant from the National Science Foundation is preparing two career brochures, one for college students and one for high school students. A wide distribution of these brochures on careers in physiology is contemplated. In order to provide the best photographic material possible of physiologists at work the Committee appeals to the members of the Society to send such photographs to Dr. Horace Davenport, Dept. of Physiology, Univ. of Michigan, Ann Arbor, Michigan. Written statements of professional activities of physiologists are desired also. Since the brochures will go to press early next year the material should be sent to Dr. Davenport before December of this year.

PRESIDENT'S MESSAGE

Problems of Democracy in a Republican Society

R. F. PITTS

A democracy is defined as a system in which government is directly exercised by the people. A republic, in contrast, is one in which sovereignty resides in the people, but administration is lodged in officers elected by and representing the people. The American Physiological Society is more a republican than democratic organization. The advantages are obvious to anyone who has served on a large committee; frequently little is accomplished, or that which is accomplished satisfies no one. A camel has been described as a horse put together by a committee.

The dangers of a republic are equally obvious. The elected officers may not be sufficiently aware of the views of the members to truly represent them. With this in mind, the President-Elect Tour was initiated several years ago to enable the new president to acquaint himself with "grass roots" sentiments.

However, in the administration of Society affairs, the members of Council, including Past-President, President, President-Elect and four elected representatives, have equal voices. On my President-Elect Tour, Dr. Alexander of Albany Medical College suggested if it were good for me to sample "grass roots" sentiments, why would it not be equally good for a newly elected member of Council to do the same. The idea seemed to be sound, and this year Dr. Comroe makes his President-Elect Tour in the Southwest and Dr. Davenport makes the first Council member tour in Canada.

The criticism has frequently and justifiably been leveled at Council that the membership is presented with "fait accompli" at the business meetings. The individual has no opportunity to express himself on controversial issues. The avenues of correction are clear. The President and Executive Secretary have only to place on the agenda the questions of most vital significance to the members and request their opinion. At this last Fall meeting in Urbana, a lively discussion revolved around the advantages and disadvantages of an integrated program at the Federation meetings. At the end, action was taken endorsing such a program on an experimental basis. This was considered a significant problem, for Dr. Comroe, as the representative of the American Physiological Society on the Federation Secretaries Committee, must decide in January whether to use the machine-contrived integrated program at the April meetings or a man-made society program similar to those of the past.

If one places a limit of one and a half hours as the duration of a business meeting which will not discourage member attendance in the future, then only one or at most two issues can be discussed at all

fully. As it now stands, the President and Executive Secretary must make the choice of the most significant problem or problems to be discussed. A radio news item which I heard recently illustrates the possible hazards of such a course. The wife of a California television executive frantically called her husband at his office. Her wrist watch had water in it; what should she do? After suggesting that she take it to a jeweler immediately, he enquired as to how it had happened. Her reply was: "When I backed the car out of the garage this morning, it rolled into the swimming pool."

Members have still another forum in which to be heard. THE PHYSIOLOGIST was started two years ago as the "house organ" of the Society. Its pages are open for the expression of individual views on controversial issues. If remarks are brief, lucid and significant, they can be heard. The thought that must go into such a "Letter to the Editor" often results in a more understandable expression of viewpoint than what one says on the spur of the moment. Still another method is to write to the President or members of Council.

Council met for a full two-day period prior to the teaching and scientific sessions at Urbana this Fall. Much time was devoted to what might be termed the mechanics of Society affairs. However, two major questions were discussed affecting every member of the Society, namely, Society finances and the stand of the Society on the use of animals in experimental work. No definitive actions were taken, for some expression of membership viewpoint seemed necessary; furthermore, the problems are not as yet clearly defined. They are presented here with the hope that your views will be expressed in these columns or be communicated to me or to some member of Council.

Many members are unfamiliar with the basic financial structure of the Society. In fact about the only way to understand it is to serve as a member of Council and be charged with maintaining a balanced budget. The average member faced with the minimum dues bill of $18.00 per year can rightfully inquire why the Society is not in a good financial position. The breakdown of this minimum bill is informative.

Physiological Reviews	$8.00
Federation Dues	$4.00
American Institute of Biological Sciences	$1.00
Federation Business Office Services (roughly)	$ .50
	$13.50

The Society therefore receives from each member for all services other than publications about $4.50. With a membership of roughly 1750, the total dues income amounts to $7,875. This sum obviously cannot provide a full-time Executive Secretary, his secretary and a central office at Beaumont House. It cannot support the educational activities of the Society, including workshops, the summer training program for college teachers, the teaching sessions at our meetings and the preparation of brochures for students and teachers of college and high school biology. A year ago Dr. Davis discussed the rela-

tionship between size of an organization and its financial structure. He pointed out that our Society had long since reached a size such that the officers could no longer, as amateurs and at their own expense, manage Society business in their university offices. Professionals have to do the job.

The balance sheet on dues, presented above, demands other sources of income. These include overhead on government and foundation contracts supporting educational activities, rebate to the Society from the Federation registration fees, honoraria from the President-Elect and now Council member tours, and services rendered by our Executive Secretary's office to the Federation and to Publications. Dues cover roughly a third of the immediate operating costs of the Society.

The Society is entirely solvent for the year 1959-60. Why worry? Certain educational programs come to an end in 1960. They were pioneering ventures and served such a demonstrated need that large agencies are taking them up on a biology-wide scale. When they do so, income from overhead will cease. Both Council and the Education Committee feel that no program should be continued for the sheer sake of overhead to finance the Society, if that program can be operated more effectively by another group.

A second fact, unknown to most members, is that the finances of the Society and of Publications are, through by-laws and long tradition, entirely separate. Earnings of Publications are devoted to new publication ventures. For instance, the production of the Handbook of Physiology will, for a number of years, absorb much of the earnings on invested capital as well as on the two profitable journals, Physiological Reviews and American Journal of Physiology. Eventually the investment may all be realized, but not in the near future. When it is, new ventures will be entered upon.

As a member of Council at the time the decision was reached, I was a strong proponent of subscription to one of the journals as a requisite of membership in the Society. Those who made the decision felt that each member should support one of the most significant functions of the Society, namely the publication of its scientific journals. The pain of doing so was to be tempered by reduced rates to them. However, Council was not entirely altruistic. It was felt that the extra copies of the journals could be printed and distributed to members for less than the member charge. That is, the increased press run, although sold at a lower price, would in itself result in a net profit. This profit could reasonably be turned over to the Society, since it resulted directly from member subscriptions to journals. In fact some 10 years ago, exactly such a proposition was made by the Board of Publication Trustees to the Council and was rejected.

Both views and methods of bookkeeping change with the passage of years. The present concept of those in charge of Publications is that there is no profit from member subscription, indeed a loss. Furthermore, even if there were a profit, it would rightfully belong to Publications, not to the Society.

The question I would like to pose is the following: If it is necessary to increase dues to keep the Society solvent in 1960-61, should compulsory journal subscription be dropped? A year ago I would have argued against this course. There is, however, a limit to what members can be expected to pay, especially if, as claimed, what they pay hurts our journals rather than assists them.

A second problem facing Council is how to prevent irreparable harm to the many physiologists using experimental animals by the few who engage in questionable experimental practices. We as members of the American Physiological Society have a code on the Use and Care of Animals by which we presumably abide. What shall be done when some of us in a burst of scientific fervor step beyond the pale? The immediate problem is the following. Physiologists have long been concerned about the abnormalities of function engendered by general anesthetics. Where discomfort to the animal is minimal and no greater than that to which the investigator may himself be willing to submit, no problem exists. The experiment can justifiably be performed without anesthesia. The increasing use of muscle relaxants increases the complexity of the problem. If operative procedures are minor and performed under local anesthesia prior to administration of a muscle relaxant, there is again no problem. The animal can object if hurt and the investigator can correct inadequate local anesthesia. The objectionable practice is use of a muscle relaxant to render the animal tractable, and the performance of operative procedures under local anesthesia with no adequate guage of anesthetic efficacy. Add to that either central or peripheral stimulation and the whole experiment becomes completely indefensible under our code.

Most of us would avoid an experimental design of such nature. Why should we be concerned about the few who do not? Apart from the fact that it may hurt our finer sensibilities to realize that such experiments are done, it bears directly on our future use of animals in accepted humane experimental studies. The Animal Welfare League has sponsored Federal legislation which enforces the humane slaughtering of food animals shipped in interstate commerce. This we can support wholeheartedly as individuals and as a Society. However when legislation was passed, it was reported that the next goal of the Animal Welfare League was legislation of controls on the use of experimental animals shipped in interstate commerce. For many scientists this means bureaucracy, red tape, licensing and restrictions similar to those in Britain if not even more frustrating. The problem of control of animal experimentation is far more complicated than the control of slaughter of animals. To avoid restrictive and inflexible legislation, we should keep our house in order at all times.

The ideal solution to this problem is proper experimental design by the investigator himself, with care that all procedures be carried out in accord with our code of experimental ethics. There are questions which should be left unasked and unanswered. If an investigator must be curbed, it should be done in his own institution. There is, however, the practical problem of what to do about papers submitted to our journals for publication. No member of our Editorial Boards

relishes the task of being the arbiter of what is or is not humane in another man's experimental design. My personal view is that each editor must be exactly that, in as impartially a scientific sense as he is the arbiter of the scientific adequacy of the man's experimental design and the validity of his conclusions. The American Physiological Society could scarcely condone, by publication, results obtained in experiments violating our accepted code for the humane care and use of animals. Here is a touchy question of censorship and, in a sense, of loss of scientific freedom. In the interest of democracy, an expression of membership views is desirable.

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22 H	O	D	G	K	I	N	S

CROSSWORD PUZZLE ANSWER

ACROSS

1. Second President of APS
6. Prefix meaning not
7. Preposition
9. Officer of the day
11. Node or bundle
12. Embryonic stage
15. Public disturbance
16. Large barrel
17. Indefinite article
18. Type of injection
19. Therefore
20. Half a printer's measure
22. A malignant disease

DOWN

1. Muscle recorder
2. Musical note
3. A time changed by heparin
4. Printer's measure
5. Lifting muscles
8. Well pleased
10. Title of 1 across
11. Expression of sorrow
13. Therefore
14. Type of rays
20. A redactor
21. Dr. Gregory to speak before this Section

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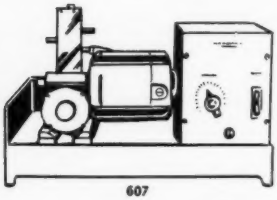
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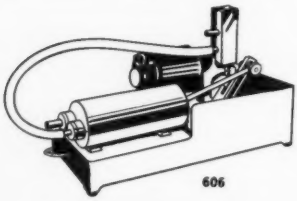
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